DOCUMENT RESUME

ED 083 382 CE 000 316

TITLE	Industrial Arts and the Challenge of an Urban Society. Representative Addresses and Proceedings of the American Industrial Arts Association Annual Conference (35th, Atlantic City, N.J. 1973).
INSTITUTION	American Industrial Arts Association, Washington, D.C.
PUB DATE	73
NOTE	485p.
EDRS PRICE	MF-$0.65 HC-$16.45
DESCRIPTORS	*Career Education; *Conference Reports; Curriculum Development; Elementary Grades; Environmental Education; *Industrial Arts; *Industrial Education; Secondary Grades; Teacher Educators; Urban Environment; *Urbanization
IDENTIFIERS	AIAA; *American Industrial Arts Association

ABSTRACT

General session addresses focus on urban society and its impact on environment, government, and education with special emphasis on the industrial arts. Seventeen speeches within the AIA divisions of ACESIA, ACIAS, ACIATE, and AIACSA are included. Representative addresses from the major group and special interest sessions deal with the following subjects: accountability, aerospace, career education, construction, curriculum, environment, games, individualized instruction, interdisciplinary studies, manufacturing, materials, metric system, power, professional publications, special education, teacher education, technology, and urban crisis. The business of the Association is also reported. A comprehensive index is included. (MS)

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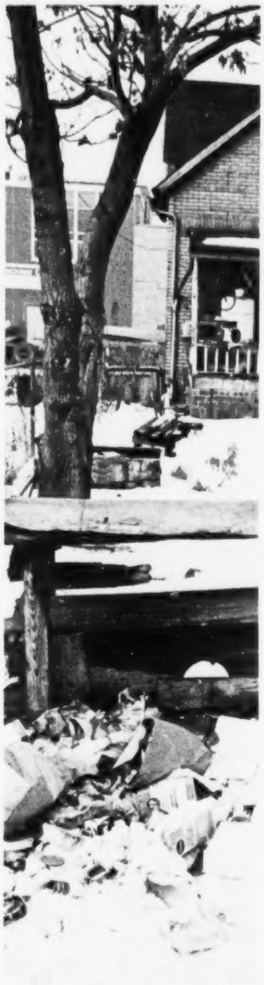

Industrial Arts and the Challenge of an Urban Society

Representative Addresses and
Proceedings of the American
Industrial Arts Association's
35th Annual Conference at
Atlantic City, NJ, 1973

aiaa
AMERICAN INDUSTRIAL ARTS ASSOCIATION

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1201 16th St., N.W.
Washington, D.C. 20036

Cloth Bound - NEA Stock #641-21354
Paper Bound - NEA Stock #641-21352

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GENERAL SESSION ADDRESSES

The Environment of Urban Society

H. Wentworth Eldredge

Urban society today centers around the industrial city which itself — a product of the Western world's industrial revolution — is only about 150 years old. There are important precursor city types prior to the industrial form, and there will most certainly be a post-industrial city.[1]

Man stopped his roaming hunting stage with the beginning of the settled Neolithic villages over 10,000 years ago; from these emerged with ever-increasing size, complexity, and grandeur the fantastic pre-industrial cities of antiquity. They must have been wondrous to behold (if one held one's nose) with their gaudy barbaric vibrancy. Sumer, Babylon, Thebes, down to Athens, Alexandria, Rome, Istanbul. For the upper classes a wondrous, if short, life could be possible in these great centers; not for the poor. Leaving the West, there were ancient Delhi, Isfahan, Peking,[2] and much later in the Americas Tenochtitlan, Chichen Itza, and Cuzco reached their own high development prior to the arrival of the armed conquistadores with their guts, gall, and primitive cannon. Many African and Oriental cities today still—although touched with exported industrial lesions—remain in this pre-industrial stage.

Returning to the main line of Western development again, urban life developed through the medieval towns to the bustle of London, Paris, Florence, and Ghent in the fifteenth and sixteenth centuries, on to the suave elegance of Moorish Spain in Toledo, Cordova, and Malaga. In time handicrafts gave way to the putting-out system; wind and water were harnessed, and simple trading cities in the Lowlands and in England began the plodding march toward industry. With more sophisticated agricultural technology, tenant peasants were thrown off the land and searched their fortune in the city. Stadtluft macht frei — "city air brings freedom" according to the medieval German proverb. The serf became the free burger — or did he?[3]

Generally he landed in a dank workshop factory and lived in a filthy hovel often attached to the job. The noisome factory of early 'Coketown' emerged to produce a flood of goods — and to crush its operatives once fossil fuels were harnessed to the steam engine. Iron and coal are our heritage — our environment — and as recent ecological-environmental furor attests, we have not yet learned to live here physically — much less societally. In the two-million-year, twenty-four-hour time clock of man's life on earth, only the last few seconds have been lived in industrial cities. We are neophytes, rank amateurs at the urban game.

The pushes of changing agricultural styles and the pulls of job and excitement acted as strong centripetal forces packing in-migrants into the industrial towns — coming from peasant villages across the wide oceans to people America's raw new cities (for the record, slaves were of little use in industrial factories — much too costly to keep them well fed and eager to work). The first industrial cities were tight little places of shops, jobs, dwellings; and remnants remain in the central business district today within the narrow boundaries of the non-functional political city of the United States.

With the advent of the steam suburban trains and the electric trolley commenced the first phase of metropolitan centrifugal expansion into "the street car suburbs" of the late nineteenth and early twentieth centuries. With the advent of private wheels — the now omnipresent automobile — and metalled highways on a considerable scale after World War I, the second phase of metropolitan expansion took place. Post-World War II saw with explosive force and super highway facilitation (not to mention the accessibility of F.A.A. mortgages) the drive to gobble up the hinterland in square miles of faceless suburbia.

Thus the metropolis became standard urban society. The old central city (locked into its archaic limits and archaic politics) became surrounded by a host of suburbs, each pursuing a disconnected, blythly-selfish pattern, although still sucking on the tit of old mother city.[4]

But the metropolis has already been out-distanced and is slopping in an untidy fashion into the next, forming a megalopolis or urban region. Atlantic City is but one gaudy "Hedonopolis"[5] in BOSWASH, the formless urban giant reaching from Boston to Washington — actually from southern Maine to northern Virginia — with a population of close to 40,000,000 urbanites. There is SANSAN (San Diego - San Francisco) and CHIPITTS (Chicago - Pittsburgh) over here and in Europe RANDSTAD HOLLAND (Utrecht, Delft, Rotterdam, the Hague, and Amsterdam) and the GOLDEN TRIANGLE aforming linking Paris, London, and Brussels. In Asia can be found Japan's PACIFIC BELT (their name for it) tying Kobe, Osaka, Kyoto, Nagoya, Tokyo, and Yokohama like sulphurous beads along the new Tokaido Line ("The Bullet Train") averaging 130 miles per hour with departures from Tokyo every ten minutes during the day.

Konstantinos Doxiadis, the Greek philosopher/planner promises us Ecumenopolis or the world city of continuous urbanism for the middle of the next century — unless man stops breeding. Although nothing will stop the 7,000,000,000 world population almost certain for 2000 A.D.; the breeders are all here already hard at work.

In the 247 Standard Metropolitan Statistical Areas (SMSA) of the United States and Puerto Rico now dwell 70% of the population, with 31% plus in central city and 38% plus in the suburbs. We are now, of course, a physically urbanized nation; we are also a psychically urbanized nation as the remaining 30% non-metropolitan dwellers tend to wear the same clothes, eat the same foods, drive the same cars, watch the same TV programs, and at times appear to have the same ideas as urbanites. With the advent of "the wired city" as it is called, based on two-way cable TV and "people's satellites" with infinite channels as a possibility, everyone will be wrapped in one big happy urban communications reciprocating network for transactions, education, and amusement![6]

THE NATURE OF THE URBAN ENVIRONMENT

It is obvious that we all spend most of our lives in the urban environment; it is hard to escape in the late twentieth century unless it be to Yellowstone (a wilderness slum), some mildly polluted beach, to the tinsel make-believe of a Disneyland, or TV, or even drug-Utopias. This urban environment is actually a national system with territorial subsystems and functional subsystems, all of which is a rather complicated way of saying that describing the city today is in fact close to describing America. And that in describing America as an over-all system or Gestalt, a holistic planner must accept that "everything relates to everything else" before attempting for analytical purpose to break this macro-urban environment apart into meaningful, functional subsystems. To treat portions separately of the great booming complexity of the urban scene is merely a device to offer graspable intellectual handles for first understanding and, second, guiding urban society hopefully in a "good" direction.

There are four convenient functional subsystems, interpenetrated and symbiotic (linked and depending on each other), which can be fruitfully examined:

1) the natural environment
2) the man-made physical environment
3) the societal environment
4) the cultural (internal) environment.

The Natural Environment

It can be argued that there no longer is a natural environment; it is so man-modified. But Mother Earth does at least exist, as we know from the astronauts' photographs, although not so easy to glimpse clearly these days. The air is fouled up and the sun hides; the good earth is covered by asphalt and buildings, scarred and littered, robbed and debased; the water has turned to smelly scum, both fresh and salt variety; plants and forests are sad in the urban place and fight a losing battle;[7] animals/birds/fish have the World Life Foundation and the Audubon Society as friends, but few others, it would seem.

We have left garbage on the moon, garbage in space, and garbage now forms multiple tiny planets round our earth. Possibly there is only a romantic amenity value in a joyous lusty physical environment, but it is getting perilously close to questions of health/life and death, as everyone now knows. There is hope: the Thames in London is coming back, and good fish again swim up to the city; birds fill the parks as smoke-free area bans lead to clear central city air. Both the Israeli and the Chinese are reforesting their unhappy barren lands, and even we brought the Dust Bowl under control in the 1930s. There are the Green Fingers of fresh woods reaching into central Stockholm and Oslo; lakes are coming back again slowly (see Minneapolis' fine inner suburban system). But there is still much to do, and cries of Zero Economic Growth (ZEG) and a "steady state earth" are of great concern to young technologists who are joining those who rightly perceive that the crucial nub of the whole thing is simply too many people. Zero Population Growth (ZPG) is the new slogan.

The Man-Made Physical Environment

It can't be escaped! At the personal level men are wrapped in clothes, grasp utensils, tools (pens), have eye glasses, hearing aids, false teeth, and wigs. Some carry tape recorders, wrist watch alarm clocks, and personal radios strapped to their bodies; a few have artificial organs, limbs, and electronic heart regulators. And everyone wants private wheels. In our dwellings humans are crated, padded, aided, cozened, and annoyed by things that are quiet and things that are to be directed and move in alarming ways making nasty noises. Suburban dwellers' contact with Nature in the 100 x 50 garden estate is lightened by the power mower and that lovely necessity, the snow blower, riding tractor. At the community level, there are man-made hospitals, schools, police stations, theaters, transport (public wheels), parks, government installations, police cars, and streets, to name some of the more omnipresent man-made portions of the physical environment. Our economic life cages us in stores, factories, offices, and supplies us with power, communication media, storage, and transport (semi-public wheels and wings). A "city" can be looked upon as a production center for goods and services which it trades with other centers for desired goods and services (of course, a city's "economic" system must serve itself). Thus an inefficient work environment spells Nekropolis, a dead city. This is the well-known balance of payments problem here on a mini-scale — an urban accounts system.

For good or for evil, we are contained in a man-made physical shell just as a box turtle is locked into his carapace. There will be no return to nature shortly possible; there is no place to hide from the man-made world on earth — except for short spells with enormous man-made support systems.

The Societal Environment

Naturally, as a social scientist, I am convinced that social institutions are a more powerful and important part of our real world than harried nature or physical gadgetry; some of you may differ. Theoretically, it is possible to evade the network of custom that entraps everyone in a civilized society which is presumably able to offer a rich variety of options. Closer examination indicates that options are limited by what a particular society at a particular period in time has built into its social structure.

Component major parts of the societal or social environment which industrial city dwellers face here in the 1970s can be crudely and incompletely broken apart for rapid examination into four parts: (a) a stratification system, (b) family/community institutions, (c) the mixed economic system and (d) the political scene.

(a) A stratification system. All societies have classes (and some have castes) and some form of hierarchical ranking of individuals in a status system (Jean Jacques Rosseau and current egalitarians to the contrary). Such a system may well perform important functions in motivating people into getting society's necessary tasks done. While classless society is an old Marxian shibboleth, practicing Marxists have done poorly (see "the New Class" or bureaucracy in the USSR) and Mao's Red Guards turned loose in the Great Proletarian Cultural Revolution to purge their grasping bureaucrats in the late 1960s. Frankly, though, the mobility question of how to climb the status ladder (or descend) is the key to a reasonably satisfactory situation; the newest in-migrants to American cities are stymied. The black population does not have vertical mobility to go up or even horizontal mobility to move out to the suburbs to escape the grinding pressures of the central city ghettoes now exacerbated by the vicious drug culture. Between 1960 and 1970 there was an increase of 3,200,000 blacks and 500,000 "other races" in the SMSA's central cities, while 600,000 whites left. This resulted in a suburban SMSA increase of 15,500,000 whites while blacks added only 800,000 to the suburban rim of the central city metropolitan population. As a result, the black revolution has simmered down a bit with a shift of tactics to central city politicking where power now is in the hands of the black majority (or close to it). Newark, Washington, and Cleveland are cases in point, all having had or have black mayors.

Still, planners and their social scientist friends believe that until there is easy relief for compacted black populations in central city to move into the suburbs, there will be urban troubles.

(b) Family/community institutions. It is not clear that the conjugal nuclear family of man, wife, and a few children is ordained in the Laws of Nature. Actually, Americans practice serial monogamy, with one-fourth to one-fifth of marriages ending in divorce. In the big impersonal manheap of the city, personal psychological reinforcement and actual close social aid could conceivably be found in the family and this most certainly does occur in the middle class which (at least until the puberty rites of the young) has found in privatism a haven. There is no community to speak of in the old small town/neighborhood sense in suburbia or middle-class central city areas. Conversely, the working class and the lower class poor need support both of family and friends and sometimes find it while, especially with the latter group, sometimes they don't.[8]

The welfare worker is the only community "warmth" available to the often-alienated poor – read "black" all too often. At the same time, feeble attempts are being made and have been since the New York Regional Plan Association plan of 1929 to build "physical neighborhoods" in the hope of creating "community" once again (more prevalent in a less mobile age) for the amorphous central city populations. These quasi-neighborhoods are conveniently located around an elementary school, parks where possible, shopping facilities, and minimal community buildings as infrastructure; there are in almost no cases jobs available except in the "New Towns in Town," a more sophisticated recent idea. Welfare Island in New York City and Fort Lincoln in Washington, D.C., have a much richer mix planned with advanced education, local government, wider community public and private furniture, and jobs – not to mention ideas of pedestrian-free central plaza/bazaar-like areas.

Concurrent with this increasingly sophisticated thinking about urban society, there is quite likely a reaction to black power on one hand and a general reaction to the WASP establishment on the other showing in a growing sense of ethnicity and a desire to hang onto the old heritage. Italians in Newark feel this, and insults to the Mafia in Brooklyn are perceived as insults to *Italia*. Actually, the melting pot idea was too naive and far too rapid a "solution" to the heterogeneous American population inputs. Who wants one dead level of mass culture, in any case? Newer conceptions of multi-group society are based on ethnicity for those who wish: various Slavic groups in Detroit; the Jewish subculture; Chinese special cultural facilities in San Francisco as well as a growing Japanese identity there (furthered by the Mother Country), as once Imperial Germany aided German immigrant societies in the years prior to World War I.

Thus societal and physical designing are at work consciously and semi-consciously, weaving a slightly richer future tapestry of options (both ethnic and other) for the American future in hopefully identifiably local configurations. It should be recorded here that the "non-territorial community" at the professional level which generally transcends space and the extreme suburban horizontal mobility militate against a narrow spatial concept of the neighborhood as the Swedes, for example, have discovered in the neighborhood planning of their brilliant semi-satellite cities surrounding Stockholm. People like to move further in their Saabs and Volvos than the original largely physical designers believed they would.

The loss of community (the loss of any sense of local togetherness and responsibility)[9] is one of the main causes for the sad rise – if our crime statistics are to be believed – in "crime in the streets" and "crime in the home;" the senseless violence, cruelty, viciousness of the young hoodlums – again the drug culture – who for one reason or another feel and are outside the general society/culture of the U.S.A. Widespread fear is the result. The hard indifference often of onlookers – remember the savage crowd egging a potential suicide on a roof cornice to jump for their thrill of the day – is reminiscent of the vacuous *plebes* of Rome amused in the coliseum by bloody circuses – having been fed their bread.[10]

Was it not Pogo who said, "We have found the enemy and he is us." A guts reaction to all this animality, of course, was Nixon's re-election in 1972.

(c) *The mixed economic system.* At the present juncture, one is tempted to say mixed-up system as the United States, the richest nation in the world, fumbles its way into the future almost rudderless – complaining loudly all the time.

In short, pure private capitalism no longer exists – if it ever did. Business and government are partners (along with the labor unions) as the economy is controlled and directed in a hit-or-miss fashion (there is no national plan, as, for example, Japan and France enjoy) through credit manipulation, massive subventions, wage and price controls, etc. At the same time, shrewd American big business has opted to get out of the confines of a national economy and turn international,[11] as IBM so well illustrates. American investments within Europe, it is said, now form the third most powerful economic combine in the world. In addition to a politico-economy and the international corporation, there is a well-advertised and increasingly powerful "consumerism" symbolized by Nader advocating production for "use" rather than for "profit" within capitalism. This is hardly a new idea; actually it already had firm roots in the 1930s when the Consumer's Union took the same line (relatively unnoticed), and socialism has been on the same theme for 150 years.

These macro trends, of course, affect the urban environment with some rather special local twists. The growth of the urban service industries continues (tertiary) and now the information (quaternary) communication/knowledge industries are felt by many to be moving into city dominance. Central city has lost traditional industry and much shopping (along with the middle-class whites) to the suburbs, but still remains the headquarters for big business, big government, and big recreation from the colossea for sports spectaculars to the rather feeble higher culture, which is increasingly priced beyond the means of most citizens.

City jobs require skills; the impacted poor lack such skills, and whatever has been done to upgrade their capabilities does not seem to be of much help to date. Neither bussing nor the poverty war has been a spectacular success in upgrading the lower class (a technical term for those "below" the working class).

The city is high technology, and with growing automation of clerical duties through the computer, both clerk and lower management echelons are already threatened. The reaction from the work ethic (the Protestant "God is Dead") is leading to "sliding work hours" (differential arrivals and departures) and to the four-day work week with commuting to Vermont for the long weekend. One book editor, it appears, lives outside of Florence, Italy, in a sunny villa and checks into New York for a week every month! With the slow advent of "the wired city," it may be that the high-tension interaction center of the big city is not so needed; meetings and conferences are already scheduled for the non-city airport motel. If amusement comes by "air waves" (as much does now) and jobs by telephone, why commute to unrewarding central city? Actually the great urban renewal drive of the past 25 years has been to bail out Central City — will it be worthwhile to continue? The answer is still not altogether clear.

Finally, an interesting controversy is being waged about the middle class, cop-out children of those 'who have made it'; on one hand Consciousness III in William Reich's rather silly book The Greening of America and on the other that hard-headed sociologist Peter Berger, who succinctly states that if the Ivy League products (WASPS and Jews) don't want to run the store, the sturdy ethnics clambering out of the working class via Notre Dame and Rutgers will. Pareto called this the circulation of the elite; the torch of rule falls from effete hands to be seized by rising new eager ones.

(d) The political environment. The job of governing the urban place is too big clearly for the old political city; the municipal structure lacks the territorial mandate, resources, skill and sufficient political clout to manage the functional city, which, of course, is the metropolis. There is no government for the functional city; and it is ruled by pure luck. Ideally, it would seem that both central city and the myriad suburbs would agree that a government for this functional metro is needed at once; actually, for varied reasons, they don't. And councils of government without power result; the question is how to govern without government? The states are little help, although New York State with Edward Logue's Urban Development Corporation has the theoretic right (which it could not exercise in Westchester) to come in and overrule inept local seclusive non-planning efforts to maintain lily-white suburbs. How, incidentally, is it all right for ethnic, Japanese, Chinese, black communities to be built, but not for the middle class?

The old bossism is pretty much gone in central city (Chicago an exception) and embattled mayors (who often quit) negotiate among elaborately differentiated interest groups sliced in 15 different directions. It is an unrewarding task of juggling, and it is quite surprising that anything ever gets done, in the politics of confrontation, rhetoric, scream, and the odd truncheon. The egalitarian ethic comes to the fore questioning whether political democracy is possible without social and economic democracy; as the Republican presidential victory and Governor Nelson Rockefeller campaigns in New York State show, dollars exert an enormous leverage. On the other hand, if every group has the right to interfere with veto powers, political democratic government will simply stop working — it has little enough power now — facing the fact that all planning hurts someone. Presumably, the someone suffers for the general welfare, but in a sordid atmosphere of "I'm alright, Jack," "me firstism" and loud-mouthed participatory democracy, stasis results.

What resources of its own the urban place has are largely derived from the property tax, but increasingly as grants from the federal government. There are (or were until the recent Nixonian halts) 675 separate grants to the cities from the federal government. Clearly they are not packaged in any sensible fashion (little cities are not clever enough generally to maximize their take) or delivered easily. The bureaucratic hassle is incredible, with up to 50% and above of federal grants melting away in administrative costs. The present Nixon stoppage has been undertaken for, among other things, to figure out how to get "the biggest peacetime bang for a buck," and no one can deny that the locals must have a major say in what personally affects their lives – whether they understand much about elaborate programs or not. Some sort of late twentieth century synthesis must be forged to unite fruitfully the thesis of "popular democracy" and with the antithesis of expert, forceful government.

Americans must face especially in the city the hard fact that they can have what they want but they will have to pay more for it with higher taxation. Personal disposable income will not buy today (1) adequate housing (only one-half New York's population can afford a decent unsubsidized dwelling), (2) adequate health care, (3) adequate education (which is today moreover a public sector shambles in the city), (4) adequate transport, (5) adequate recreation facilities and the higher culture, to name a number of the more obvious perceived needs. There is going to be in the final decades of the twentieth century pretty clearly an income distribution problem among our citizenry, which will undoubtedly be solved by transfers through the public sector.

The Cultural (Internal) Environment

Probably the main goal of modern living is self-realization – the utmost use of one's capabilities. It is unquestionably behind the search-for-identity of rampant youth, fem-lib, and the sense of feeling stifled that so many blacks have so strongly. The urban place has traditionally offered the richest fare for a varied and rewarding life. The "critical mass" of a city today is perhaps a population of 100,000 to 250,000 in order to explode into the great spectrum of opportunities which only intense human interaction can offer. In the city are to be found all the visual arts (including architecture), music in its varied forms, the theater (what is left of it presently in America), ballet, the great active museum collections (very aggressive they are today – see New York's Metropolitan Museum of Art and Greek vases). Over history, creativity has bloomed – appropriately half-starved – in the great city. In some rare cases, the patron prince, pope, or city has "kept" a well-fed and well-producing artist or musician. The task of nurturing creativity has not yet been picked up by private corporations, despite their proclaimed "social orientation." Actually, there is a sharp conflict on such beneficence between welfare demands and provision of the "higher culture." It would seem that an overwhelming percentage of the population is starved for spiritual/intellectual fare and don't know it; they are, in fact, truncated humans separate from, although technically living in, the great mainstream of civilization supposedly entrusted to the city's care.

There are three levels of the artistic/intellectual scene: creation, display/perform, and consumption. The potentials are there in the urban node, but they are priced out of the hands of the great majority – or perhaps worse, as indicated above, there are potentialities to participate at all three levels that are simply not realized. Only awareness plus talent plus facilities can lead to creation; free time and space – plus basic living expenses are needed to bring something new to civilization. To display/perform requires space, trained people, and the costs of production; it is not commercially possible to present the "higher culture" at a profit to the general public – only to selected rather affluent sub-publics. The two finest ballets in the world, the Bolshoi and the British Royal Ballet, are "socialist," which simply means government subventions on a vast scale.

It is obvious that with the increasing leisure (rather, free time to kill) piling up per day, per week, per year, and per lifetime,[12] something must be offered to the restless human animal besides mindless sitting before the idiot box drinking in soap operas, professional gladiatorial combats, and beer. Our society does at this moment of history offer insufficient internal resources (education in its deepest sense) to utilize the bounty that health and a long life now offer – freed for most of harsh toil.

True participation seems far ahead; at best, one can participate in spirit only, watching the clever exertions of the highly paid pros. What would it mean in capital to provide stages for all TV watchers to be in amateur drama or in acreage to provide football fields or baseball diamonds for the Sunday afternoon millions of fans watching their beloved Jets or Giants? There would be no great plains left to grow bargain wheat for the starving Russians.

CAN THE URBAN ENVIRONMENT BE GUIDED/MANAGED?

No one at this juncture is clear as to whether there is enough data, wisdom, consensus of goals, and resources to direct this awful/awesome urban flood. The United States has some considerable catching up to do; we have mortgaged our cities by spending our wealth in the private sector, and now the mortgages are falling due. The widespread urban malaise – the long laundry-list of city problems – is too well known to restate here.

A closer look at the next 30 years indicates that: (a) something like 80,000,000 more Americans are likely to pile into the SMSAs. To cope with this new horde, replace the substandard assets already here and replace the physical urban assets that will fall apart in these next three decades will in effect be equal to all the construction in the United States since Columbus "discovered" where the "native Americans" were already living.

(b) In a multi-group society such as ours, there are bound to be differing values which, projected, are goals. Further, no one now seems ready to release his pet option in favor of anyone else. What is the general welfare, and who will define it? To plan, to manage, to guide needs a consensus which we are unlikely to have. Further mercurial value shifts (fads) will continue to run through our society.

(c) We are all chasing a mechanized rabbit: a standard-of-living (goals largely in material terms) which keeps streaking ahead of the real world level-of-living that is not, of course, shared equally. John K. Galbraith has noted that heavy production creates its own demand (see the automobile industry), reversing the theorem of the classical economists.[13] But what of Zero Economic Growth now in the face of the ecological furor? Our population can never be satisfied with the vicious triumvirate of frustration/tension/aggression which stalks snarling eternally just outside the door, and this cannot be answered without increased productivity. The "haves" are not prepared readily "to share the wealth."

(d) The resource demand for the public sector to create the replacement and new infrastructure of a 300,000,000 inhabitants-plus America will bite into personal disposable income heavily through taxation. Will we face it?

(e) The American troika system of a federal republic, historical-accident states and swamped antique political cities hemmed in by selfish slurbs is not adequate structurally to cope with the rapid social change, huge populations, and elaborate industrial and post-industrial technology. Even a Rockefeller can write in 1973 of *The Second American Revolution.*[14]

While it would be foolish to be too sanguine, there are already bits and pieces of a National Urbanization Policy/Plan/Strategy (NUP) lying about which, with major additions and some alteration, could be fitted into a societal/physical scheme capable of coping with the urban environment. This would be a system of sufficient magnitude to have real meaning. Both Senator Humphrey and Senator Jackson have presented bills for a national land use strategy – exploiting traditional physical planning expertise – to be administered through the states. The Environmental Protection Agency is slowly moving to a position of power, using that area of sharp public interest as another handle to gain control for the general welfare of our ravaged country; while social welfare – in the broadest sense – is being downgraded presently by the Nixon 1973-74 budget, there is unquestionably here a ground swell of barely coherent (as yet) public demand for economically distributive legislation building up. By 1946 the federal government had already been charged with guaranteeing full employment. Very shortly there will be a national health insurance system; it already looms on the horizon. There are even ominous mutterings about nationalizing the Pennsylvania Railroad; could it be worse?

It should not come as a shock to other Western nations that America is at last considering a national planning effort, since all advanced ones (as well as the communist bloc and at least 50 developing nations) have national territorial development plans in various stages of semi-perfection, notably France, Holland, Sweden, and "honorary Western" Japan. England, unfortunately, has not even reached semi-perfection; and her pound is as sick as the dollar, indicating perhaps some sort of common inadequacy.

The bare elements of a NUP that have to be developed and interlocked ("everything relates to everything else") are five-fold:

(a) *Population policy*, amount, type, and gross location nationally as well as within the metropolis/megalopolis.

(b) *Macro-territory to micro-territory land use plans.* A national land use plan by activity centers, including new nodes of expanded cities or, in a few cases, new cities of importance (500,000 population). This could follow the *metropoles d'èquilibre* (equilibrium metropolises) which France has planned to balance Paris.

(c) Short, middle, and long-range plans in time, in a cybernetic "rolling planning system," where new plans really feed back in loops to revised goals (values), resource bases, and fresh plans continuously.[15] As the chief planner of Stockholm remarked, "Everything lasts longer than one thinks." Ad hocery has not paid off for us either in Urban Renewal or Indo-China.

(d) Societal institutional design joined with physical structure design bridging in a reinforcing fashion not yet clearly envisaged. The relationship of behavior to the physical environment is only commencing now to be studied empirically,[16] and as explored above the entire range of social, political, economic, "cultural" planning is only barely understood. Our task has been likened to redesigning and rebuilding an aircraft in flight!

(e) Policy sciences or delivery systems. Finally, all plans are paper duds if not "delivered" and put into action. Pretty pictures and grand words are relatively easy (!) to concoct but to have them operate as planned in the real nitty-gritty world is the next skill to be mastered. The so-called policy sciences aim at such delivery and are an amalgam of operations research/systems analysis, the behavioral and social sciences, future studies, and the intuitive wisdom of the practical politico. More data, more knowledge, more manipulation (in mathematical models — mostly on the computer), more experimentation in the real world and feedback into the whole operation. Only thus can be created a rich fare of alternate feasible future urban environments to fit the expanding options which America must produce for its hundreds of millions. It is going to be a rough road ahead to reach such a state.

FOOTNOTES

(1) Sociologist Daniel Bell's term.

(2) Cf. Arnold Toynbee's handsomely illustrated Cities of Destiny (New York: McGraw-Hill Book Company, 1967).

(3) Lewis Mumford, The City in History: Its Origins, Its Transformations, and Its Prospects (New York: Harcourt, Brace & World, Inc., 1961) tells this whole story beautifully. There is a paperback edition, Harbinger, H607.

(4) Robert C. Wood, 1400 Governments (New York: Doubleday Anchor, A389, 1964) indicates how impossible it is to run the New York metropolitan area covering portions of three states with that amazing total of "separate" governments and subgovernments.

(5) John Sommer, Dartmouth geographer, coined this happy phrase.

(6) John Dakin, Telecommunications in the Urban and Regional Planning Process (Toronto: University of Toronto Press, 1972).

(7) Japan's beloved pines are dying back from her roadsides; and plastic cherry blossoms now decorate downtown in Tokyo and Kyoto during the Cherry Blossom Festival.

(8) Cf. Herbert Gans, The Urban Villagers (New York: Free Press, 1962), and Lee Rainwater, "Fear and the House as Haven in the Lower Class," Journal of the American Institute of Planners, January 1966.

(9) Jane Jacobs, The Death and Life of Great American Cities (New York: Random House, 1961). Mrs. Jacobs feels this loss of community poignantly; her solution, based on multi-purpose streets, is merely primitive.

(10) Is this the appeal today of the violent films, violent TV, and professional football and hockey? The not-so-covert wish to see someone hurt!

(11) Peter Drucker, The Age of Discontinuity (New York: Harper and Row, 1968), especially Part Two: "From International to World Economy."

(12) Cf. Sebastian de Grazia, Of Time, Work and Leisure (New York: The Twentieth Century Fund, 1962). This is "leisure's century."

(13) Cf. The New Industrial State (Boston: Houghton Mifflin Company, 1967), chapters XVIII-XX.

(14) John D. Rockefeller, III, The Second American Revolution (New York: Harper and Row, 1973). See my The Second American Revolution: The Near Collapse of Traditional Democracy (New York: Wm. Morrow and Co., 1964).

(15) A typical linear program would be (1) goals (values), (2) resource base plus trends, (3) alternate plans, (4) the plan, (5) the plan in operation.

(16) Robert Sommer, Personal Space: The Behavioral Basis of Design (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1969). This is an area of increasing interest and importance.

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AIASA Program

Greg Pickett

Why does the president of the American Industrial Arts Student Association present an address to the members of the American Industrial Arts Association? Because AIASA is your organization. It was officially organized by the AIAA at their 27th annual conference in Tulsa, Oklahoma, in March 1965. Why does the AIAA support AIASA? I'm going to explain the relationship between AIASA and the AIAA.

The AIAA is a teacher-oriented organization. Most of its members are educators in some field of industrial arts. Any teacher organization which hopes to prosper and grow depends on the student. Without the industrial art students, the AIAA would definitely lose the leaders of tomorrow. Right now there is a shortage of industrial arts teachers needed to handle the load of industrial art students. In my own state of Louisiana there is a drastic shortage of certified industrial arts instructors.

If we can interest students in industrial arts courses and student clubs, then AIAA will grow. Any organization, especially one like the AIAA, needs an effective feeder program to prepare for the future. The students who are members of the industrial student clubs have expressed an interest in industrial technology. If we don't work to broaden this interest, if the student clubs fail, and if you—as educators—don't provide the guidance needed in student clubs, we are defeating the whole purpose of education.

The greatest killer of high school industrial arts clubs is the teacher. With 57% of all high school students taking some form of industrial arts, the potential club membership stands at 5.5 million. You are the teachers – the individual your students look to for the guidance and understanding they must have. By offering your services as a club leader, you are ensuring that everything possible is being done in the interest of your students and your profession.

It is a proven fact that the American Industrial Arts Student Association flourishes when the AIAA shows an interest in it. Looking at AIASA membership since the organization began, we see a fluctuating growth. We also see that this growth fluctuated with AIAA interest and support. In 1966, Miss Wilma Schlup was hired by Dr. Howard Decker, Executive Secretary of the AIAA, as the first student club coordinator. In 1967, membership stood at 1,715. In 1968, it rose slightly to 1,768 members. In 1969, Miss Schlup resigned, and Dr. Decker hired Miss Minnie Warburton. Under the direction of Miss Warburton, the membership grew in 1969 to an astonishing 5,219. But in 1970, Miss Warburton was dismissed by the new executive secretary. After Miss Warburton's dismissal, the membership decreased by over 2,000 in 1970 to 3,151. In 1971, membership fell again to 2,946. In 1972, a slight increase was noticed as it rose to 3,238 members, but the clubs were still functioning without a coordinator. In September of 1972, Dr. Edward Kabakjian hired another student club coordinator, Mr. Howard McKinley. Under the direction of Mr. McKinley, membership grew in just seven months to 4,675. We can definitely see that AIASA has flourished when it has obtained AIAA support – and AIAA support is what I'm asking for tonight. We have our student club coordinator; we have 5.5 million potential club members; the students have expressed the desire to join the student clubs. The only thing lacking is the guidance and direction that only you as teachers can provide.

Many AIAA members have taken an active interest in their student clubs. Men like Mr. Andrew Gasperecz, Mr. Billy Mayes, and Mr. Phil Schooley have taken leadership roles in AIASA. The AIAA members who have volunteered their service to work on the AIASA Executive Committee are the backbone of AIASA. Every teacher who has taken part in organizing an industrial arts club in his own school has contributed to the growth of AIASA. What we need now instead of support from a few individual AIAA members is widespread interest and support from all the AIAA members.

Americans have changed from an agrarian way of life to a highly technological society. The vast majority of young people must find a place in the industrial and technical fields basic to our modern way of life. As an AIAA member, you have seen this change take place and can realize the important purpose of the student industrial arts clubs. These clubs familiarize the student with the industrial and technical fields of today. These clubs further the education of today's youth in an industrial society through such activities as industrial tours, clubwork, and leadership conferences much like our own AIASA convention. They help improve the students' attitude toward industrial arts courses and give them a chance to express themselves. The club develops the leadership abilities of both the students and the sponsors, while helping to improve teacher-student relations. And perhaps more important to industrial arts as a whole is the fact that the student clubs provide a good avenue for public relations. What better way is there to spread the word of industrial arts than through a student industrial arts club striving to make its school and community a better place in which to live?

The motto of AIASA is "Learning to Live in a Technical World." We students need your guidance to learn to live in this technical world, and we express this need in the second paragraph of the AIASA creed. "Guided by my teachers, craftsmen from industry, and my own initiative, I will strive to make my school, community, state, and nation a better place to live."

I am willing to wager that the future growth of the AIAA will fluctuate with future AIASA growth. If AIASA remains in a dormant stage for the next 10 years with a membership of say 10,000, AIAA growth will be moderate during this time. But if AIASA grows to 500,000 or a million nationwide members in the next 10 years, interest in industrial arts will skyrocket, and the AIAA will see a tremendous growth in its own organization.

I truly believe that the ultimate stage of your organization, the American Industrial Arts Association, can never be achieved until its feeder program, the American Industrial Arts Student Association, is working at full force. The only thing that has been holding back AIASA growth is lack of communication between AIASA and AIAA. AIASA can never function without AIAA support, and the AIAA means nothing without AIASA. The choice is yours.

Greg Pickett is AIASA President, 1972-73, and a high school student from Lafayette, Louisiana.

Analysis and Urban Government: Experience of the New York City—Rand Institute

Bernard R. Gifford

The problems of New York City can boggle the mind. Take the problem of law enforcement. Despite the presence of a police department with 32,000 men and a current annual budget that exceeds $750 million, large segments of the city's population are afraid to walk the streets at night, especially the city's one million plus senior citizen population.

After the sun sets, many neighborhoods resemble ghost towns. In the ghettos, charlatans sell electric burglar alarms, hooked up to nowhere, for outrageous prices to poor people who have so little to protect. In many middle-class neighborhoods, illegal hand guns sell like hot-cakes to people who consider themselves hard line advocates of "law and order." Allegations of corruption in the police department have created a widening chasm of distrust between the department and major segments of the community. And cynicism about the over-all efficacy of the criminal justice system is the subject of newspaper stories on an almost daily basis.[2]

Other neighborhoods, such as my old one, Central Brownsville, look like Dresden after the war. Fires gut some buildings over and over again. Firemen attack their sworn enemy with mechanical efficiency, motivated by professional pride, but also confused and distressed over the futility of waging war with what at times seems to be a phantom army of pyromaniacs. In that same neighborhood, platoons of heroin addicts, with their drooping eyelids, pock-marked cheeks, and dart board veins roam the streets and send waves of fear and apprehension throughout the arteries of the neighborhood. Some residents of the community claim that it has more drug addicts than it has high school graduates.

Even the traditional escape hatch from the quagmire of poverty, the neighborhood's schools, seem to have become victims of an environment saturated with fear. Violence in the schools is considered by many to be *the* major educational issue. The city's teachers' union is involved in a struggle with the Board of Education to have at least one armed policeman placed in every school. At the same time, city-wide examinations of students' reading ability indicate that the Brownsville schools are an educational disaster area. In none of the community's primary schools are more than 30% of the student body reading at or above grade level.

The problem of poverty is also staggering. While the nation was experiencing a minor recession during the past few years, Brownsville continued to be mired in a depression as deep and as pervasive as any experienced by any segment of American society during any period in recent history. Nearly 50% of Brownsville's population receives public assistance payments from the City of New York's Department of Social Services.

If Brownsville were only a benign aberration, it would still represent a tragedy of major proportions, but Brownsville and its array of social pathologies is not atypical; in fact, there are many Brownsvilles in New York City and in other major American cities, and they seem to be growing steadily. Crime, deteriorating neighborhoods, drugs, failing schools—under these and many other pressures, the white middle-class has stepped up its exodus from the cities: from 1960-1970, nearly one million migrated from New York (see Table 1). During this same period blacks and Puerto Ricans, responding to the same opportunities that attracted so many before them, continued to be drawn to the city; they now constitute nearly 35% of the city's population.

Table 1. Age of White Population Exclusive of Puerto Ricans in New York City, 1950-70

Age	1950	1960	% Change 1950-60	1970	% Change 1960-70	% Change 1950-70
Under 5	561,475	456,370	-18.7	317,127	-30.5	-43.5
5 - 9	460,705	407,692	-11.5	316,594	-22.3	-31.3
10 - 14	377,370	423,483	+12.2	333,784	-21.2	-11.5
15 - 19	398,390	367,099	- 7.9	356,424	- 2.9	-10.5
20 - 24	494,305	341,257	-31.0	423,434	+24.1	-14.3
25 - 34	1,094,940	754,778	-31.1	650,885	-13.8	-40.6
35 - 44	1,123,375	820,789	-26.9	579,895	-29.3	-48.4
45 - 54	1,030,085	917,187	-11.0	695,903	-24.1	-32.4
55 - 64	765,410	828,372	+ 8.2	735,374	-11.2	- 3.9
Over 65	577,605	737,089	+27.6	849,260	+15.2	+47.0
Totals	6,883,895	6,054,116	-12.1	5,236,998	-13.5	-23.9

SOURCE: Rosenwaike, Ira, Population History of New York City, Syracuse University Press, 1972.

The loss of so many white middle-income taxpayers coupled with a massive influx of thousands of poor black and Puerto Rican families, who required increased and more specialized social services, has severely strained the city's ability to raise the revenues required to support these programs without fomenting racial and class hostilities that seem to be continuously fermenting and periodically exploding.

In 1971, New York City, with 4% of the nation's population, paid to its 1.2 million welfare recipients 13.4% of the total amount of direct money payments to public assistance recipients in the United States. It is estimated that New York City has 50% of the nation's heroin-addicted population.[3] Many of these addicts receive public assistance while undergoing treatment in publicly-financed treatment programs. In 1969, New York City spent more money on its police department (569.7 million dollars) than the combined totals of Los Angeles, Washington, D.C., Denver, Chicago, Boston, Detroit, St. Louis, Cleveland, and Philadelphia.

New York City's fiscal problems have been exacerbated even further by sharp changes in the age profile of the city: the city's population in the age group 30 to 60, the years of peak earning capacity, fell 12.5% from 1960 to 1970; but its 65-and-over population increased 16.5% and its under-21 population increased by 6.3%. During this same ten-year period, New York's total population grew by only 1.5%.

Reactions

The responses to these drastic social, economic, and demographic changes were quite varied. Some public officials tried demagogic exhortation. But this tactic, even when successful,[4] seemed to result only in further polarizing the city along racial, ethnic, and income lines, and migration to the suburbs became increasingly attractive to whites and to the newly-emerging non-white middle class who, having voted the politics of fear, were now running away from it.

Other public officials took the position that the problems facing New York could be handled by simply expanding the scope and budgets of old programs. This group, I would venture to speculate, represented the majority opinion.

A third and most influential group took a much more active role in forcing the city to confront its future constructively and creatively. Not only did they push for a major expansion of "new deal type" social programs, they also aggressively fought for the creation of many new efforts. However, in their desire to "cool things off" and to "right old and neglected wrongs," they heaped social program on top of social program without giving much thought to whether any of them really worked, or which efforts were having the impacts desired, and which might even be making things worse. Evaluation efforts lagged miserably behind fiscal commitments; major funding became available before program designers had any notion as to how their programs would actually work in the real world. Poorly-designed programs with large constituencies grew, while promising programs languished because their advocates lacked passion or political sophistication. Resources were fragmented, goals became fuzzier, priorities seem to change daily, confusion set in. As program after program failed to meet noble objectives, taxpayers grew restive, professional advocates of change became increasingly defensive, conservatives grew more cynical and more powerful, and client groups became more frustrated and demanding. Writing about the Community Action Program, Aaron Wildavsky has aptly described this process.[5]

> A recipe for violence: Promise a lot; deliver a little. Lead people to believe they will be much better off, but let there be no dramatic improvement. Try a variety of small programs, each interesting but marginal in impact and severely underfinanced. Avoid any attempted solution remotely comparable in size to the dimensions of the problem you are trying to solve. Have middle-class civil servants hire upper-class student radicals to use lower-class Negroes as a battering ram against the existing local political systems; then complain that people are going around disrupting things and chastise local politicians for not cooperating with those out to do them in. Get some poor people involved in local decision-making, only to discover that there is not enough at stake to be worth bothering about. Feel guilty about what has happened to black people; tell them you are surprised they have not revolted before; express shock and dismay when they follow your advice. Go in for a little force, just enough to anger, not enough to discourage. Feel guilty again; say you are surprised that worse has not happened. Alternate with a little suppression. Mix well, apply a match, and run . . . .

Although Wildavsky's cookbook description may be somewhat distorted, it is not without a large element of truth. Recent social programs were not very well planned before they were initiated. In fairness to the originators of programs, it should be pointed out that there was little time to work through a series of rigorous cost-benefit analyses for each new social initiative. The nation was literally burning and all programs, poorly conceived or well thought out, seemed to have equal priority.[6] But we are now paying the price for this neglect.

Fiscal Response

The problems I have discussed have been experienced — in varying degrees — by most major American cities. During the 1960s, we euphemistically called them the "urban crisis" and made them the subject of endless conferences, commissioned untold numbers of studies, and produced truck-loads of recommendations for governmental reform and new spending priorities.

During the 1960s, local government budgets grew at a record pace: from 1960 to 1970, state and local government annual expenditures increased from 51.9 to 131.3 billion dollars, an increase of 153% (see Table 2). In New York City, always the leader, the expense budget grew at an exponential rate, increasing from 2.35 billion dollars in fiscal year 1960-61 to 7.74 billion dollars for fiscal year 1970-1971, an increase of 229%.

These trends were replicated at the national level. Expenditures for "Great Society" programs increased from 1.7 billion dollars in 1963 to 21.2 billion dollars in 1970 — from 2% of the total federal budget to 11%. National social welfare expenditures increased from 52.3 billion dollars in 1959-1960 to 170.8 billion dollars in 1970-1971, an increase of 227%. Income support programs increased from 10.0 billion dollars in 1950 to 102 billion dollars in 1972-73; from nearly 5% of the gross national product (GNP) to almost 9% (see Table 3).[7]

Yet ballooning budgets, expanding staffs, and a myriad of new programs (coupled with greatly increased budgets for some old favorites) seemed to do little to help reverse the social and economic conditions threatening to turn vast portions of New York City and other major cities into stockades for the aged, the poor, the non-whites, the addicted,

Table 2. Governmental Expenditures for Selected Years: 1952-72
(Billions of Dollars)

Year	Total[a]	Federal	State and Local
1952	93.7	71.0	25.3
1957	114.9	79.6	39.5
1962	159.9	110.3	57.6
1967	242.9	163.6	95.1
1972	372.0	246.8	162.9

SOURCE: 1973 Economic Report of the President.

[a] Federal grant-in-aid to state and local governments are reflected in federal expenditures and state and local expenditures. Total governmental expenditures have been adjusted to eliminate this duplication.

Table 3. Federal Expenditures for Income Support Programs, Selected Fiscal Years, 1950-73

Program	1950	1960	1970	1973 Estimate
		Billions of Dollars		
Retirement and Related, Total	3.8	16.7	49.2	72.6
Veterans' compensation and pensions	2.2	3.4	5.2	6.4
Military retirement and medical benefits	0.2	0.7	3.0	5.1
Civil service retirement	0.3	0.9	2.6	3.9
Railroad retirement	0.3	0.9	1.6	2.1
Old age, survivors, and disability insurance	0.8	10.8	29.7	44.7
Medicare	-	-	7.1	10.4
Unemployment Compensation	2.0	2.6	3.1	5.9
Public Assistance and Related, Total	1.0	2.3	8.3	16.1
Aged, disabled, and blind	0.8	1.4	1.9	2.8
Families with dependent children	0.2	0.7	2.2	4.7
Medicaid	-	-	2.7	3.8
Food stamps	[a]	[a]	0.6	2.3
Other nutrition	[a]	0.1	0.4	0.7
Housing subsidies	[a]	0.1	0.5	1.8
Other, Total	3.2	3.7	5.1	7.1
Student aid	1.6	0.4	1.3	3.4
Farm price supports	1.6	3.3	3.8	3.7
Total Benefits	10.0	25.5	65.7	101.7
Cash benefits	10.0	25.1	54.4	82.7
Benefits in kind	[a]	0.4	11.3	19.0
		Percentage of Federal Expenditures		
Total Benefits	23.2	27.7	33.8	39.4
Cash benefits	23.2	27.2	28.0	32.0
Benefits in kind	[a]	0.4	5.8	7.4
		Percentage of Gross National Product		
Total Benefits	3.8	5.1	6.9	8.6
Cash benefits	3.8	5.1	5.7	7.0
Benefits in kind	[a]	[a]	1.2	1.6

SOURCE: Schultz et al., Setting National Priorities: The 1973 Budget.

[a] Less than $50 million or 0.1%.

and the civic outlaws. In addition, many people began to doubt not only the efficacy of government programs designed to make the city a better place to live in, but government itself. Wrote Peter F. Drucker:[8]

> There is mounting evidence that government is big rather than strong; that it is fat and flabby rather than powerful; that it costs a great deal but does not achieve much. There is mounting evidence also that the citizen less and less believes in government and is increasingly disenchanted with it. Indeed, government is sick—and just at the time when we need a strong, healthy, and vigorous government.
>
> We still repeat the slogans of yesteryear. Indeed, we still act on them. But we no longer believe in them. We no longer expect results from government. What was torrid romance between the people and government for so very long has now become a tired, middle-aged liaison which we do not quite know how to break off but which only becomes exacerbated by being dragged out.

The "War on Poverty" did not end poverty; job-training programs often trained people for non-existent jobs; compensatory education programs did not seem to compensate for whatever weaknesses they were designed to overcome; drug rehabilitation programs failed miserably, and drug addition reached epidemic proportions in many cities; police budgets seemed to be rising faster than the crime rate; some unions seemed to be in a race to see who could bankrupt the cities first; although we were landing men on the moon with dulling rapidity, we still could not make our trains run on time, and the lack of decent mass transportation facilities in most of our major cities was a national disgrace; welfare rolls skyrocketed; progressive mayors voluntarily left public service frustrated and confused, or were turned out by voters in favor of candidates armed with simple slogans promising painless solutions to tough problems.

New York City

In New York City, Budget Director Frederick O'Reilly Hayes decided, on taking office in 1966, that the taxpayers of New York City were not receiving municipal services commensurate with the heavy tax burden they were shouldering. Even more important, he was acutely aware of the growing tensions in the city resulting from disenchantment with governmental programs. After a series of small attempts at generating internal reforms, centering on an attempt to develop a Planning, Programming, and Budgeting System (PPBS), Hayes began to feel that he would have to look outside the formal structure of city government for assistance in developing the PPB system and for innovative ideas on how to run the city more efficiently and effectively. His experiences, in effect, had taught him a lesson well put by Drucker:[9]

> Certain things are inherently difficult for government. Being by design a protective institution, it is not good at innovation. It cannot really abandon anything. The moment government undertakes anything, it becomes entrenched and permanent. Better administration will not alter this. Its inability to innovate is grounded in government's legitimate and necessary function as society's protective and conserving organ.

Thus, in late 1967, Hayes decided to invite The Rand Corporation into New York to become actively engaged in the front line of urban research and policy analysis. Hayes had known Rand, its people, and its urban studies, from his federal government experience — he had had key jobs with the Department of Housing and Urban Development and the Office of Economic Opportunity.

The first Rand analysts who arrived in New York City in January 1968 typically had advanced degrees in such sciences as economics, mathematics, engineering, and operations research. The first agencies they worked with were the Police Department, the Fire Department, the Housing and Development Administration, and the Health Services Administration.

Hayes had no illusions about the ability of Rand analysts to immediately solve the many problems faced by New York City and its many Brownsvilles. His goals were much more modest. In helping to create a "think tank" based in New York City, Hayes and the early leadership of the New York Rand office established the following goals for what was eventually to become The New York City-Rand Institute.[10]

> It was to be independent enough to be critical of city policies, insulated enough from the city's daily operational concerns to work persistently on underlying problems, close enough in its

> working relations with city agencies to devise recommendations that were timely, realistic, and useable. Given time, it would become a major center for urban policy analysis, a repository of detailed understanding of how the city worked and of the forces working upon it. Unlike occasional special purpose consultants, we would work steadily with city agencies on a broad range of their problems; unlike university-based urban study groups, would measure success in terms of decisions affected rather than of students trained or reports produced.

Nature of Policy Research

Fred Hayes' initial contact with The Rand Corporation and the subsequent creation of The New York City-Rand Institute in the fall of 1969 was probably, more than anything else, due to Hayes' understanding of the need for, and the importance of, policy-oriented research and analysis.[11]

Studies undertaken by The New York City-Rand Institute are quite different from those usually turned out by traditional academics, in that they are designed and carried out to bring about changes in the way public officials perceive problems, make decisions, and allocate resources. Policy-oriented research never takes a back seat to an author's desire to publish "a piece of elegant research" in a professional journal, his desire to train students, or to invent or market a new technological gimmick. While traditional scholarly research tends to be esoteric, intellectually narrow, and strapped in a methological straightjacket, policy-oriented research is comprehensive without being vacuous; interdisciplinary, yet not superficial.

I should emphasize that nothing pejorative about "pure" or academic research should be inferred from this description of policy research. Often a distinction is made between "pure" and "applied" research in order to imply differing standards of intellectual rigor. This emphasis is misplaced. In good policy research, outlook is as important as approach, and the need for intellectual rigor remains. If a researcher takes the position, however, that research is its own reward; that he will not compromise his intellectual integrity and maybe his peer group status by worrying about issues of relevancy; that he will not make a special effort to communicate his results in language comprehensible to the intelligent policy decision-maker; then policy research is simply not his "cup of tea."

CHANGING POLICY ORIENTATION: SOME EXAMPLES

Fire Protection

Some changes in the way city officials perceive problems, set priorities, and allocate resources will result immediately from policy-oriented research. Other suggestions made by The New York City-Rand Institute analysts may be implemented over an extended period of time, while other recommendations again may prove too radical to consider under existing political and economic conditions. For example, our suggested changes in the way Fire Department dispatchers should react to incoming alarms during peak alarm periods were implemented immediately and have doubled the Fire Department's capacity to dispatch fire equipment during periods of high numbers of alarms. This has resulted in improved fire service to areas that have high fire activity and a high percentage of false alarms (e.g., Brownsville). We have also spent several years helping the Fire department to develop a computer-based management information system which will make possible more flexible and effective deployment of fire-fighting apparatus through the mathematical manipulation of four criteria: resources available, company workload, the probability of a fire being serious, and the time lag between an alarm and the arrival of firemen (response time).[12]

Housing

Our work for the Housing Development Agency (HDA) has resulted in policy recommendations that could affect the city and the nation for decades to come. Our analysis of the relationship between tenant incomes, rent expenditures, landlord revenues, and the supply of well-maintained housing indicated that rental revenues for a large portion of the rent-controlled housing stock in New York City were so low that landlords were not maintaining the buildings and in many instances were abandoning their properties after deterioration had become irreversible. Between 1965 and 1968, 114,000 units of housing were abandoned by their owners or withdrawn from the market. Between 1960 and 1968, the inventory of sound housing had increased by only 2.4%, while the proportion of dilapidated housing increased by 44%, and the fraction of deteriorating housing increased by 57%. We also found that minority and poor people, who tend to live in older buildings and to move quite frequently, were more likely to be paying market rents for their apartments than better-off tenants who were not as mobile, since rent increases were tied directly to tenant turnover. In short, poor people in Brownsville derived proportionately fewer economic benefits from the city's rent control law than middle class apartment dwellers living on Central Park West.

Our findings led us to suggest major modifications in the city's rent control law, which had been enacted in 1943 as a wartime emergency measure. A key suggestion was a rent assistance program for low-income families unable to pay the higher rents required to provide landlords with sufficient incentives to maintain their properties. Our rent assistance plan was based upon the following principles:[13]

1. Rent assistance should be available to all low-income families, not a lucky few.
2. Rent-assisted budgets should allow for rent expenditures adequate to cover the full costs of a low-to-moderate level of housing consumption.
3. Rent assistance schedules should not be designed so as to discourage those who can increase their incomes by gainful employment from so doing.
4. The amounts of rent assistance granted should be the minimum consistent with the first three principles.

Unfortunately, because of fiscal constraints, HDA did not fund the rent assistance program we recommended, although many administration officials favored the plan. However, the research we did for HDA has served as an intellectual template for work The Rand Corporation is now doing for the U.S. Department of Housing and Urban Development to design a rent-assistance experiment for the entire country. Perhaps the day will come yet when rent assistance is a reality in New York City.

Ecology

When a particularly close relationship exists between an Institute analyst and the head of a city agency, the payoff on research can be enormous. Such a relationship has developed — after some initial official skepticism — between the Institute and the head of the city's Environmental Protection Administration (EPA).

One of our researchers was asked for assistance in applying analytical techniques to the problem of projecting and improving the water quality in Jamaica Bay, which, in addition to being a major recreation area, is also the location of the country's only wildlife refuge located within the borders of a major city. This request was prompted by the need of city officials to select optimal locations for new sewage treatment plants and to estimate the environmental impact of a number of other construction projects, including the expansion of the runways of John F. Kennedy Airport into the bay and the construction of a proposed hospital near the bay which would have required extensive dredging and filling operations.

To be useful to city officials, the model had to predict accurately the relationships between the bay's waste load, the discharge location sites, the type of treatment the wastes had been subjected to prior to discharge, the effect of the earth's rotation, and the geometry, tidal flows, and temperature of the bay. Additional models were required to predict the physical, biological, and chemical relationships between the waste load and the bay's water supply.

After a rather extensive period of investigation, we were successful beyond all expectations. Models were developed and are now being used by EPA as day-to-day planning tools.[14] Some construction projects affecting Jamaica Bay are being reconsidered or have been shelved. In addition, variants of the models are now being developed for Tampa Bay in Florida and Port Royal in South Carolina, under the auspices of the U.S. Geological Survey.

Technology Transfer

Sometimes our research brings about change through technology transfer. A good example is "rapid water." The addition of trace amounts of a cheap, harmless chemical to the intake of a fire engine's water pump results in an increase in water pressure and distance the hose stream can reach. Our role: uncovering the existence of this chemical, explaining its possible uses to the Fire Department, finding a manufacturer to modify the substance physically, and finally supervising the experiment where the agent was tested under actual fire-fighting conditions. Result: smaller, lighter hoses, more maneuverability, more aggressive attack, reduced property damage, and increased life-saving capacity.

We are presently analyzing in great detail the technical and economic feasibility of a comprehensive early fire detection and warning system which would be placed in old buildings, where the probability of serious injuries resulting from fires is quite high.[15] Each detector, at the first sign of an outbreak of fire, would emit a coded signal that would be transmitted to and decoded by a small computer tied into the Fire Department's planned computer-based management information and control system. This signal would then unambiguously identify the location of the fire, its magnitude, and probable severity. Alarm systems at the scene triggered by the detectors could help arouse sleepers or warn people in adjacent rooms in time for them to flee. The detectors could also activate automatic extinguishing and containment systems to control the fire until firemen arrive. The Institute is now trying to arrange for a pilot system to be designed, installed, and evaluated.

In short, as these examples point out, the quest for change is the engine that drives policy research at The New York City-Rand Institute. Educational benefits (except in the broad sense of the term), pedagogic pursuits, traditional professional or disciplinary rewards, and corporate growth[16] are all secondary considerations.

The Institute's Style

How do we bring about these changes? Under optimal conditions, before working on a given project, Institute analysts will review a set of problem areas in the city agency concerned shoulder-to-shoulder with the people who are responsible for finding solutions. After an agreement has been reached on objectives, measures of performance evolved, and preliminary data gathered, the researchers will usually perform a series of analyses (usually quantitative) and, whenever possible, create analytical models relating resources to goals, goals to results, and results to benefits. Working notes are produced for the clients, discussions are held between the analysts and their agency counterparts, and often a formal briefing will be arranged to solicit additional criticism and suggestions for improvements from a wider audience. The problem might then be redefined, objectives restated and attacked from a different perspective. I should emphasize that this procedure of problem-solving by iteration can only be carried out when there is client support and interest which, as we have learned, will be forthcoming only when the agency is convinced that the work is relevant, timely, and implementable within existing political, bureaucratic, and fiscal constraints. (Often our research results in an expansion or redefinition of these constraints.)

Nevertheless, there will be occasions where this iterative process will not result in agreement. If the analyst is convinced that his line of investigation will lead him to a better set of answers than the agency's and agreement on research strategy is impossible to obtain, the Institute will often support the analyst to continue his work from its own funds.[17] Where a strong relationship has developed between the analyst and the agency, the agency will sometimes allow the analyst to pursue his line of investigation with minimal interference. Unfotunately, this does not happen as often as we would like it to. We usually find ourselves in a position where our own analytical abilities provide the criterion for deciding which projects to support from Institute funds. On balance, we have been rather lucky so far: our experience with the Police Department is illustrative.

During our first year in New York, the New York City Police Department (NYPD), under the urging of the Director of the Budget, Fred Hayes, entered into a contractual relationship with the Institute. For a number of reasons the relationship went sour; we were perhaps insensitive to the ethos of the NYPD; they were suspicious of us and quite jealous of their autonomy, as is any other large city agency. They only went through the formalities with us; they did not let our researchers into their files; they answered only those questions they were asked and volunteered nothing. They largely rejected recommendations made by Institute analysts in more than 60 separate reports and memoranda — even though many of these reports were later judged, by a number of Department officials and experts in the field of criminology and police science, to be among the best criminal justice research done in their areas.[18-20] (Moreover, it should be noted that several recommendations were actually put into practice by the NYPD.)

Eventually, the Department stopped sponsoring research by the Institute, but our researchers went ahead on further studies with only limited cooperation from the police and no city funds. The studies turned out so well that on their basis we were able to reestablish a new contractual relationship with the NYPD after Patrick Murphy's appointment as Commissioner.

THE STAFF

What about the people who work at The New York City-Rand Institute? What makes a psychologist, economist, or engineer with an outstanding academic record, a Ph.D. from a "good university," and maybe a secure position in government or academia, take a job where he is expected to do analytical research in the middle of an environment where public officials have traditionally avoided setting clearly-delineated policy objectives, sometimes out of fear of alienating powerful political interest groups, or because priorities simply could not be set with any degree of precision or confidence? First: Some more questions.

Can policy research be done in this environment? Martin Luther King once wrote: "When you are right, you cannot be too radical; when you are wrong, you cannot be too conservative." But what do you do when you honestly don't know if you are right or wrong, or whether your ideas and programs will really affect the people you are trying to serve in the way that you have anticipated? How do you design a welfare program that encourages self-sufficiency through job creation but is not punitive; that provides adequate income but is also fair to the non-welfare poor; that minimizes fraud but stops short of being a police agency; and is sensitive to the problems of welfare recipients without encouraging generation after generation of welfare dependency? How do you determine who is to get what kinds of municipal services from the city? Should city services be allocated on the basis of need, or greed, or political clout? What is the best organizational mechanism for delivering health care to the poor?

I hesitate in offering a stereotype of the Institute's staff, since they are as varied in personality, philosophy, and perspectives as they are numerous. But certain common themes seem to crop up in most conversations: "How can we help the people of the city, through their elected and appointed officials, to make decisions with a higher degree of confidence, accuracy, and precision? How can we vigorously challenge the preconceptions of people we work with, but not insult or alienate them? How can we ask embarrassing questions without appearing to be arrogant? How can we stir unrest and create uneasiness about sloppy procedures or bad policies without shattering the fragile psychological membrane separating resentment and reassessment?" These questions, I believe, tell us a great deal about the personal and intellectual characteristics required of scientists who are contemplating work on the frontiers of urban policy analysis. Let's list three crucial ones.

First, the researcher who is contemplating conducting policy analysis in an urban setting must possess a sense of curiosity that drives him to look for solutions to many of his problems from rather unorthodox data sources. Often knowledge of bureaucratic legends, anecdotes, values, and vernacular is just as important a source of data as an impressive array of numbers or a stack of computer printouts. Answers to the problems that confront the people who are trying to make cities work cannot be found in textbooks, where bodies of accepted theory are expounded and illustrated by many successful applications, exemplary observations, and errorless experiments. The urban scene is not so predictable.

Urban policy analysis is a search for a pattern where none has previously been recognized; for similarities in a sea of differences; for disagreement in a desert of complacency. Propelled by curiosity, the urban analyst must confront every problem with a barrage of questions, knowing that there are few definitive answers to most problems, but only more and tougher questions.

In addition to being curious, the analyst must be pragmatic. He must recognize that inaction is an attractive form of action to many who are confused by the past and frightened of innovation; that few decisions are made in a sanitized value-free environment, devoid of political controversy. He must understand that bureaucratic inertia is often the most rational response to a controversial issue in a city where all decisions seem to carry the seeds of confusion, polarization, and conflagration. Recognizing this, he begins his analysis with things as they are rather than as he would like them to be. No litmus tests for ideological purity are administered to governmental officials before a problem is attacked. But an environment conducive to open discussion and debate is sought, nurtured, and, once obtained, fought for with great tenacity.

Finally, the analyst must be, in the words of Jacques Barzun, "a man of ideas, with a mind accustomed not merely to holding facts in solution but to crystallizing them for use." The cities are the new frontier. State and local governmental spending will exceed 320 billion dollars by 1980. We desperately need to take a careful look at what kinds of cities we will be creating as a result of this rather large expenditure of funds. We need to make sure that we are not doing the right thing for the wrong reason. We desperately need scientists who understand this need and who will not be awed by its magnitude. We need organizations and institutions who will look at the city as a system and who will act accordingly.

At The New York City-Rand Institute, we have responded positively to this challenge. I hope that the city and the residents of my old neighborhood, Brownsville, will be better off because we have.

FOOTNOTES

(1) Any views expressed in this paper are those of the author. They should not be interpreted as reflecting the views of The New York City-Rand Institute or the official opinion or policy of the City of New York. Papers are reproduced by The Rand Corporation as a courtesy to members of its staff.

(2) An unexpected ecological problem resulting from the rapid growth in crime is how to dispose of the thousands of tiny mountains of dog manure (produced by the rapidly growing watchdog population) that dot the city's landscape. In the interest of scientific objectivity, I should note that many public officials seem to be more than willing to take a stand on the problem of dog manure and its disposal. The solutions offered so far are not without humor (i.e., the Pooper Scooper, contraceptives in dog food, doggie back-packs), but the problem of dog manure has not yet been licked.

(3) Drug Abuse Survey Project: Wald, Patricia M., Co-Chairman; Hutt, Peter Barton, Co-Chairman; DeLong, James V., Executive Director, et al., Dealing with Drug Abuse: A Report to the Ford Foundation, New York, Praeger Publishers, 1972.

(4) Success being measured by the number of politicians using this tactic who were elected to public office in New York City between, say, 1960 and 1970.

(5) Quoted in Moynihan, Daniel P., Maximum Feasible Misunderstanding: Community Action in the War on Poverty, New York, The Free Press, 1969.

(6) Moynihan, Maximum Feasible Misunderstanding, 1969.

(7) See Schultz, C. L., Fried, E. R., Rivlin, A. M., and Teeters, N. H., Setting National Priorities: The 1973 Budget, Washington, D.C., The Brookings Institution, 1972. Also see Table 3.

(8) Drucker, P. F., "The Sickness of Government," The Public Interest (Winter 1969).

(9) Drucker, op. cit.

(10) Szanton, Peter L., op. cit.

(11) See Levien, R., Independent Public Policy Analysis Organizations—A Major Social Invention, The Rand Corporation, P-4231, November 1969.

(12) See Blum, E. H., Urban Fire Protection: Studies of the Operations of the New York City Fire Department, The New York City-Rand Institute, R-681-NYC, January 1971.

(13) See Lowry, I. S., DeSalvo, J. S., and Woodfill, B. M., Rental Housing in New York City. Volume II: The Demand for Shelter, The New York City-Rand Institute, R-649-NYC, June 1971.

(14) See Leendertse, J. J., Environmental Simulation as a Tool in a Marine Waste Disposal Study of Jamaica Bay, The Rand Corporation P-4163, March 1970.

(15) See Doctor, R. D., Leveson, G. S., and Tenzer, A. J., An Early Detection and Warning System for Fires in Buildings, The New York City-Rand Institute, R-880-NYC, December 1971.

(16) The New York City-Rand Institute is a non-profit organization.

(17) Provided by a grant from the Ford Foundation.

(18) See Cohen, B., The Police Internal Administration of Justice in New York City, The New York City-Rand Institute, R-621-NYC, November 1970.

(19) Cohen, B., and Chaiken, J. M., Police Background Characteristics and Performance, The New York City-Rand Institute, R-999-DOJ, August 1972.

(20) Larson, R. C., Urban Police Patrol Analysis, Cambridge, Massachusetts, The MIT Press, 1972.

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Training Ground for a Professional

Merle E. Mead

What is a professional? As a teacher educator, I feel I am a professional, because I am devoted to the teaching profession. To be a professional, one must have had specialized training, earn his livelihood in that profession, and become an active member in some form of professional organization.

An industrial arts educator, through his educational process, does become a true professional. The state colleges and universities provide the specialized training and, upon completion, grant a degree that allows the industrial arts educator to earn his livelihood in his specialized area.

All too often as professionals we forget the obligation to our professional organizations. How convenient it is to let the other guy do it! Apathy has been known to be the major cause of death for many professional organizations, and the American Industrial Arts Association is no exception. The American Industrial Arts Association is the professional organization of industrial arts educators, but what would happen if tomorrow it was to be no more? Does this thought alarm you? It should if you are an industrial arts educator, because the AIAA is a vital part of our professional training ground.

The AIAA sponsors a special program to help build a strong training ground for college students in industrial arts education. Do you know the name of this organization? Don't feel bad if you don't; it seems a large number of our profession have forgotten its name and function.

The name of this organization is the American Industrial Arts College Student Association. The AIACSA is a national professional organization for all college students working toward an undergraduate degree in industrial arts education or related technical fields. The AIACSA should be the student's training ground in which to become familiar with his professional parent organization, the AIAA. I have found as national president of the AIACSA a great lack of knowledge about the AIACSA at state college and university levels.

I personally feel, as an industrial arts educator, the responsibility to inform my students of the national high school industrial arts association and should promote membership in their organization. I also feel the state colleges and university industrial arts educators should inform their students of the American Industrial Arts College Student Association and promote membership among their students. If the AIAA is to prosper and grow, steps must be taken to involve both the high school student and college student in an orientation process aimed at involving the student in a professional learning experience. The American Industrial Arts Student Association and The American Industrial Arts College Student Association are programs of the AIAA to serve this very purpose, but if they are to serve their purpose as a training ground, they must have membership and leadership. We, as professional industrial arts educators, have the responsibility to promote membership in these fine organizations and provide the leadership they must have. To let the other guy do it just will not get the job done.

The youth of tomorrow are our future professional leaders. The professional image we present to our students often will be the professional image they will present to their students if they should choose to become industrial arts educators. Is it fair to ask our students to belong to a professional organization when possibly, as industrial arts educators, we do not belong to our own specialized professional organization? I can only answer this question as a personal judgment, and I would say no, it is not a fair request.

I was instructed in my college preparation to use every available means to help my students learn and grow to become productive and knowledgeable individuals. Therefore, I feel the teacher either on the secondary or college level who does not make use of these two organizations — The AIASA and AIACSA — is cheating his students out of a valuable learning experience. The time and leadership devoted to a student organization can be one of the most rewarding and fulfilling activities a teacher can experience.

Not only does the teacher gain reward from involvement in a national professional organization, but the student gains leadership, insight, and a chance to obtain information in his field of interest from all parts of the nation. Both the AIASA and the AIACSA publish a national newspaper and newsletter. The college student receives the AIAA journal, M/S/T, and the Monitor to help him keep abreast of current issues and trends in industrial arts, but most important of all, the student has the opportunity to participate in the annual AIAA conference and gain even greater knowledge in his profession.

It has been said by someone greater and wiser than I that no organization can function without membership. Membership is not much to ask of a true professional, but if the American Industrial Arts Association is to provide a training ground for our future industrial arts leaders, they need membership, and so do their training camps, the AIASA and AIACSA. As true professionals, industrial arts educators need to promote and become involved in recruiting membership in all levels of our professional organization.

Mr. Merle E. Mead is National President of AIACSA and a graduate student at Kearney State College, Kearney, Nebraska.

The Student in the Urban Society

Harold Spears

Things have certainly changed since I started to school, and even since I've been Superintendent. When I started to school, all the attention was on the multiplication table. Today it's on the negotiating table. The negotiating table is standard equipment on the furniture supply list of any school system in this country. I can even remember back to the old math, and now it's the new math: sitting around the negotiating table with the same amount of money and trying to allot it in a different manner, taking some away from the kindergarten coloring books account and putting it into teachers' salaries or whatever.

I've been on the college campus now for five years as a visiting professor at Indiana University. I call it a "people preserve." Thirty-four thousand students there — happy as can be — as contented as cows grazing in the clover fields, students grazing in the libraries. And labor is also happy about it, protected by having all that mass of young people not interfering with the labor market in this country. There are some innovations on the campus — they've got larger parking lots, co-educational dormitories, and all sorts of vending machines. They're selling term papers now, five-dollar, twenty-dollar, and fifty-dollar machines. I tried the five-dollar one and got back my old thesis at Wabash College, 1924.

We were in the sideburns period of American school administration a few years ago — I can remember that — it seems only yesterday that the main problem was the length of the boys' hair and the shortness of the girls' skirts; now it's the length of the teachers' strike and the shortness of the school revenue. I learned early in school administration that the devil you live with is better than the ones that you don't know.

When at age 6 I entered school in a small Indiana town, Swayzee that is, it was known as the common school. The town was common, and there was a common pump on the main corner in our town. There was a common tin cup attached to that pump. If the germs were common, ignorance of them was likewise. In front of the schoolhouse was another common pump, and I can still see us kids standing there — kicking the mud off our feet after recess, lining up and taking our turn before going back into the high school or the grade school, as the case might be.

And the kids were common. Sure, there were differences among them — but we didn't have any tests to give students at that time to tell which half were above average and which were below, or all that stuff that we go into today in order to try to classify students. Nobody had heard of an IQ. Of course there were differences, some of us were better at reciting, some at going steady with the girls, some at basketball, and some at helping the teachers clean their erasers and all that type of thing. People took it as a common thing for young people and children to be different in schools in those days.

Our common school had four rooms downstairs — two grades in a room — first and second, third and fourth, fifth and sixth, and seventh and eighth. Today you would call it a non-graded school. Those teachers didn't care what grade we were in as we passed on up to the high school. And there was that stairway leading to the promised land, for upstairs there was the high school: five rooms and five teachers. Nobody got to go up those stairs until he had graduated from the Elementary School, and when he graduated he still had to take a county examination to be accepted. Ben Williamson, the Superintendent, would fan our tails if he ever caught us on those steps before we had the right to go up them. That was the high school.

It was the people's college at that time. I was a drop-in. You went to high school when you had nothing better to do. Nobody ever heard of the drop-outs yet, because people had not been institutionalized into the American High School which created the drop-out. No—I was a drop-in. My friends lived and worked on the farms. I worked in dad's store. All of us seemed to have something to do as children. Just as soon as I could chin the counter in the drygoods store, he put me to work, just as my older brothers and sisters had done. I traded goods with the farmers' wives and found out early that although you price eggs by the dozen, the hens don't lay them by the dozen—they lay them by 9, or 18, or 17, or something else, and you have to figure all those fractions. And when the frugal housewife bought calico or muslin or something else to make a dress, she'd get six and seven-eighths yards. My out-of-school hours were spent there.

I was lucky as a teacher, and in administration, to have seen all the types of people when I was a child. I knew the deadbeats, ones who wouldn't pay. I knew the ones who would question me when I candled the eggs and would have to come back and stick their noses into that machine to see for themselves. I saw people like that when I was a Superintendent. They had to be shown.

In those days teachers weren't trying to be imaginative, innovative, or exemplary in order to qualify for school funds. I happened to be in high school at the time that industrial arts and Smith Hughes funds came in. They got funds for agriculture, so we all had to read an agriculture book whether we were going to be farmers or not. In spite of the girls' helping in the kitchen at home, home economics came in. The girls all had to wear fancy uniforms and a hat as though they were going to be chefs. Then the shop came, but the five teachers in the high school already had those five rooms up there.

So what happened to the shop? I can still see it and smell it! The only place they had for it was down next to the toilets in the basement. You fellows can tell me whether industrial arts and such courses are still in that position in respect to the academic curriculum. If a person can read a page well and write a sentence well, he is counselled into the academic curriculum, regardless of where he's going. And if he can't, we'll look around to find out something else for him to do in the high school. And so often nothing practical is there.

It's surprising how our society got along in the early part of this century without educated people. By educated people, I mean educated in a formal institution. When I went to San Francisco, I found in the research files the total enrollment of the schools for the year 1908. And if you look back in the records of any place in this country, you will find that these were typical of that period.

In San Francisco in 1908 they had 10,155 students in the first grade and 5,230 in the second. The reason they had twice as many in the first was that you had to read to get out of the grade. They kept some of those boys until they were old enough to date the teacher, then they passed them on up.

The third, fourth, and fifth grades all had four thousand and some. The sixth grade had 3,588; the seventh grade 2,755; the eighth grade 973; the ninth grade 1,211 students; the tenth grade 1,033; the eleventh grade 463; and in the twelfth grade, 261. I assume that they all graduated.

I don't know how San Francisco could have recovered from the fire and the earthquake that they had at that particular time with no more high school graduates than they had in that city. I wonder how the people got along without all the formal education that we give them today. But we have a fast economy today—we are so synchronized scientifically that it's hard to exist. With our people-packed schools today, we can hardly realize that this was typical of the national situation at the turn of the century.

The community actually provided in both the cities and the small towns, with no cost to the taxpayer, parallel programs of learning on the farms and in the stores and factories. Today this unusual experience carries the fancy name of "work experience." You never heard the term "work experience" until we had to create it and try to promote it as a part of compulsory schooling. It's a rare opportunity, and only a limited percentage of youth have the opportunity to have work experience while going to high school. Organized labor frowns upon it.

A couple of years ago, I was invited out to Western Kansas by three adjoining school districts to give a 15-minute or 20-minute commencement address—if you know what I'm talking about. They have to have a commencement speaker, but then they coach him not to speak very long, which didn't bother me.

In Colby, St. Francis, and Goodland, on three successive nights, I gave this commencement speech, and then in the daytime I would live with the Board members in those communities. We talked about the urban society youth problem, but didn't pass up the rural scene. As I dealt with the Board members, there was one with 2,000 acres of wheat, and I said, "How many people help you?" He said, "I drive one tractor, my wife one, and my son-in-law one." And I said, "What happens to the boys from this community?" He said, "The small farms can't exist, so they find jobs somewhere." "But how about the beets?" They were being handled by migrant workers, and the superintendent in Goodland took me around to show me the places where the migrant workers stopped over as they moved through from the Mexican border on up north, following the crops.

What do you offer the high school student today that meets the vocational ethic of American secondary education? As you will recall, in 1918, seven cardinal principles of secondary education came out — and I'll review them for you.

"Health, command of the fundamental processes, worthy home membership, vocation, civic education, worthy use of leisure, and ethical character" — and it didn't say that a high school student was going to spend three-fourths of his day in an academic program of some sort that ignored a number of these things. Then we wonder why they drop out of school. I don't know how much we've progressed since then. You people in industrial arts have a great program — there's no doubt about it — but do you get the share of the student body that should be in your classes? I don't know — and you've got to answer that for yourself.

What is the common school today that only a few decades ago was eight grades? The term has been lost, but certainly the concept has been perfected. Before the school could ever have been properly re-tooled to serve a shifting economy, one state after another passed attendance laws, institutionalizing youth to high school graduation or to age 16. California and some other states, not to be outdone, moved it up to 18.

The high school principal today is well aware that it is an affront to the American ethic for a student to leave high school without his diploma, yet he is continually reminded that it is downright immoral to present such a certificate of public acclaim to one who is considered unworthy of that diploma. In fact, some school districts tend to placate both positions by offering a so-called certificate of attendance for those in question. Such a document is more an indication of the shortcomings of school and society than the limitations of a person.

During my last year in the San Francisco superintendency, a California Assembly Sub-Committee reported that a high school diploma is virtually meaningless because of a lack of uniform standards of graduation. Straight A students, he said, and D students received the same diploma. The Sub-Committee of the Assembly Education Committee reported all of this to the legislature as though that was an important discovery that somebody had just made. They concluded that the high school diploma is virtually meaningless "as a legal document or a permanent personal badge of honor." I don't know that the high school diploma should ever be considered either of those things. If by law all youth have to go to school, what does a diploma mean? This committee recommended that all school districts set minimum requirements for graduation, including a reasonably high record of report card grades. The Committee neglected to review the State Education Code that sets the attendance requirement to eighteen, regardless of ability.

Some time before that, one of our local school reporters made the discovery that there is a great discrepancy in achievement among high school graduates. In the case of something like this, I don't answer it.

Since starting to teach high school years ago, I have seen thousands and thousands of children going through school. That has been my life. No two of them enter with the same potential — no two of them leave with the same attainment. Under God's system of creating people, it couldn't be different. An experienced and sympathetic teacher is shocked neither by what a pupil can do nor by what he can't do. He merely does his best to help that pupil as he momentarily passes through his classroom.

In handling this never-ending procession, we don't throw those who can't back to society. A school is not like a production line in a factory, where the inspector throws out the culls. By law, California directs the schools to keep youth in school until age 18 or graduation, and these children in San Francisco schools possibly range in IQ from below 100 to 185. Teachers are there to help children, not to stand in judgment of them. For every high school graduate you think doesn't deserve a diploma, we can show you an eighth-grader whose accomplishment might well make you ask why we keep him any longer.

The schools are crowded today, reflecting not only public faith in an utter dependence upon education but an economy that no longer has a place for youth, a situation that gives him no choice. The youth who once operated a farm or a store is now considered too immature to assume that role in his society. The entrance of youth into the American scene as a distinct population group has come within our time, coming noticeably to the public attention for the first time during the 1930-1940 depression period. This population group temporarily lost itself in the hustle and bustle of the all-out effort of World War II, when everybody was made to feel important by having something meaningful to do in their community. But soon again, they found themselves relegated either to schools or to economic oblivion. Child labor laws that were originally passed to protect children from ruthless adults have since been superseded by school attendance laws that protect labor from ruthless youth, thus extending adolescence beyond the original intention of the Creator.

Our nation, through the use of good brains, the active minds, the clever portion of the mass of citizens, has got something going that ignores the bottom portion of society. You mark the cutoff as unnecessary stock. Nobody knows this better than the school teacher or administrator who follows the trails of his students, graduates, and dropouts.

The great western movement and the development of our nation called for about one strong mind to a score or more of strong backs. Of course, it took courage and determination and persistence, qualities not necessarily coupled with bright minds. Nobody cared who was smart in those days, anyway. There were no intelligence tests or achievement scores to use as brands enabling society to pick out the promising from the doubtful prospects. As long as there were trees to chop down and frontiers to be followed, schools had to compete for their personnel. A people with a simple social and economic system ask of their schools only a simple system of education, while people with a highly complex existence such as ours must demand a much more complex system of education. If there is any question about the complexity of our situation, just attend a Board of Education meeting in a large city. American society looks upon public education as a necessary road to better things, and rightly so. And consequently, in her periods of extreme frustration she turns to the schools with a half-way blaming, half-way demanding approach that makes us jump.

Re-tooling schools to serve the ever-changing American scene is not simple — it is not a case of what might be, but what needs to be under the circumstances. A school is not a luxury to be provided by personal tastes or public whim of the moment. It is a necessity calling for the dedicated skills of the professionals and justified by the fruit it bears. The soil that nourishes it today is not the fertile farm land that during my childhood deprived me in school of the association of my farm friends. We might call today the asphalt period of American man. For the great bulk of society, the hard pavement of a technological existence provides a fast getaway for some and nary a toehold for the others. The phenomenal thrust of scientific and technological advancement in our nation over the past 20 or 25 years has not been germinated in a vacuum. It reflects the impetus of industry and business to meet the exploding market profitwise, in face of the mounting cost of labor and government, costs that in one case reflect the increased standard of living and in the other the necessity of an ever-expanding network of public controls and services to synchronize the complications that accompany the high state of civilization that we have achieved in our country.

The economic machine that projects our nation forward is the enterprise system. With all the ramifications, the gimmick that has been recently installed to accelerate the pace is automation. You men know more about that than I do, because that's just not my field; it's yours. Its principal is efficiency. Its procedure is the increase of production, with the process taking precedence over people. The technical process in its perfection tends to eliminate the active worker from participation and to replace him with an effective substitute — automation. The fuel for this machine is a calculated mixture of American ingenuity and American labor. The acceleration in technical knowhow is now threatening and resulting in a counter increase in the latter. For instance, the overtime hours spent by an electronics or chemical engineer in his laboratory may, within a relatively short time, result in the reduction of the weekly working hours of a significant number of people. At graduation, a principal may drool over a merit scholarship student in science, but this same lad may well intensify the dropout problem for the principal of tomorrow when he gets going in his laboratory. It is a fast pace to which we step today.

The mounting difficulties of a non-college-bound student in our time are apparent. With the continued increase in the percentage of high school students going on to college, the secondary school tends to become more and more a college preparatory institution and less and less the distinctive comprehensive American high school that it was when I worked in it back in the twenties and the thirties. This is not by plan, but by chance. This gradual metamorphosis may not be apparent to those who administer and instruct in the school; they are too close to the operation. What is noticeable? It is the student who seems to be a misfit. As his group decreases, the more pronounced is his maladjustment. Let's face it. The means of mounting the school ladder from primary to upper elementary to high school to college, grade by grade, is the ability to read a book and to write a page. This seems to be about the only way we know how to teach in the academic area.

Recently, a high school guidance counselor showed me a half-page theme written by a boy whose spelling resembled the sounds of the words as he heard them, or as he thought he heard them. His performance was far removed from the instruction expectations at that particular high school level. The assignment, of all things, had been to write about "happiness." It was again the old story in secondary education, the sympathy of a counselor for a lad who persisted in school in spite of his humiliation at exhibiting before his peers his crippled ability to write a sentence and to read a page.

The sheet of paper stood as Exhibit X or Y in the sentence of failure eventually to be administered by the teacher. And, in the case of the teacher, it was the old story of sympathy losing out to the instructional requirements set out by the curriculum and borne out by the standard class performance. It was the continued reminder of the handicap that school counseling has faced from its introduction: the limitation of the counselor's efforts to pupil behavior, the teacher's operation being off limits because the counselor has no supervisory responsibility over a teacher. Unfortunately, a school's judgment of a pupil is passed on as the total community judgment, there being no community endeavor, no outside employment by which he can establish his worth. In other words, unlike my boyhood associates, his civic record consists of how well he succeeds in school. Thus, the responsibility of the school personnel is tremendous. We wonder if they appreciate it at times, and if it is fair for them to be placed in a position as executioners of youthful ambitions.

If a fellow does not succeed in school today, he is dubbed as a social failure — a handicap hard to overcome — a school dropout, so-called. Strange, isn't it, that the school was established as a device to help people get along in life. It was never actually set up as a court of judgment.

This condition is not of our own making, but rather a civic commitment that reflects the population's shortages in an affluent society. Such recognition of the situation by the school personnel does not absolve us of attention to the case of the non-academic student. It invites both soul searching and curriculum exploration.

You men know about the rapid change of plant equipment that we've had in this country. I can't conceive that the schools can ever expect to obtain this expensive equipment. It seems to me we've got to make a change in the high school program. Some pupils might work half the day outside somewhere, tagging along after somebody else, or using equipment at night that industry uses in the daytime. The school set-up of regular daily periods has been handed down since the first of this century, and we've never changed it. We've got to use our imagination.

At times we hear labor leaders telling school officials to concentrate on a general education for youth up through high school graduation, thus delaying any noticeable work with the hands and introduction to the trades until a later period. Educators realize the limitations of this kind of thinking. We have rationalized ourselves into a period when it is far easier to get into a college, as I've said before, than into an apprenticeship program. Youth have the right to feel important.

America is a great believer in free public education, judging students by the amount of time spent in school, the units and diplomas amassed while there. Some years ago a parent would lean over the fence and explain to his neighbor why his child didn't go to college. Now he leans over the fence and apologizes because his son or daughter has gone in but has never come out of the place. Going to school can become a way of life. If you get the hang of it, it can become very satisfying.

The public thirst for schooling is intense and never satisfied. It seems that the limits of school will never be found. To what extent the increasing popularity of college education reflects the person, and how much the economy, it's hard to say. It's now easier in California, at least, for a high school graduate to get into college than into a job, reflecting the fact that it is easier to create colleges than jobs for youth.

For ten years or more, public education has been busting out in all directions. We seem to be buying it like mad, demanding more money all the time. We're starting children younger. We put in kindergartens some years ago to prepare them for first grade; then came Head Start to prepare them for kindergarten. We hold them longer, we're pushing subjects down, we're broadening and enriching programs at all grade levels, we're providing more staff such as paraprofessionals and central office staff.

In the curriculum office, we had only one certificated person. That was the head of the office. Where did we get the other people? We brought teachers in from the schools on a leave of absence, outstanding teachers to develop programs, there for a year working on a particular thing, and then we'd send them back out into the field. That was economical, because the cost was a substitute out in the schools, the lowest on the salary scale.

We did the same thing in the personnel office. In spite of all the teachers we employed in a large system such as that, we had only one certificated person who directed the office. Helping him were six clerks who handled all the detail work. When we employed teachers, we set up interviewing boards. On each one we would have a school administrator from the field, a teacher from the field, and somebody from the central office. All we were paying for was the substitutes for the people brought in from the field. This tied your central office to the field, each year with different representatives from the schools.

We've been lengthening the school year, we've been providing more summer schools, we've been beginning bargaining across the counter with the public for one thing and the other. If you've ever been in a large board room in a large city, you know that the public comes out, and they think of things that they need. There's much competition among neighborhoods in a large city today.

In at least the large cities, budget preparation is no longer the inside job that it once was, carried on in an official and deliberate manner behind the scenes by a few people in the central office. After watching the public in an open board meeting bargain for and receive services of one kind or another, you start to think of what they did need. They were telling you something. And you became more sensitive to the needs of the schools in those communities than you had been before.

One of the increasing difficulties in financing public education is the number of separate school units that operate independently with the state legislature, the federal government, and the local citizens at the polls. It's like a poker game — there's only so much money in the pot. The competition for the school dollar is keen. A school administrator at any given level yells to high heaven if he doesn't get his share, and he's shocked if a resident dares to vote against the latest tax measure or bond issue. There is a public will to finance education. Nobody's ever figured out what it is, but there's bound to be a hidden limit, even if a particular segment of the public school must find it out the hard way.

The educational scene is made up of millions of busy professionals and non-professionals, conscientiously working away at their individual shops, at their somewhat selfish segments of the total enterprise. Nobody can blame them for their devotion to a limited sector of a whole or their tenacious defense of a school, a district, a level of schooling, a population group, etc. Nobody can blame them for their conscientious fight for public support of the particular thing that they are doing. But surely the initial recognition of the challenge falls upon the professional people.

There follows a sampling of the speaker's suggestions as to areas to be explored by the professionals before they go back to the public bargaining table and ask for more money for the sprawling array of miscellaneous enterprises known as American public education.

1. For the college-bound students, reduce by one year the school sequence from grades 1 through 12, thus recognizing the instructional efficiency achieved by our profession during the last three or four decades, just as American business and industry and the other professions have taken advantage of their research. The amputation could be made by curriculum specialists in the various subject fields, working in coordinated effort. Whenever I've mentioned this, somebody asks what grade you take out. What is a grade? Look at your school as curriculums stems, starting from the bottom — the native language up through the elementary school and into the high school, science, mathematics, history, social studies, and so on. You reduce the stems into 11 years.

Since the high school today is only a middle school for this segment of the moving mass of pupils, they are deprived of nothing in this efficiency move, for they are going on to higher education anyway.

2. Retain the non-college-bound through the 12th year. The school becomes a civic center, their base of operation until absorbed into the economy. The types of programs,

the various lengths of daily schedules, the cooperative ventures arranged with business and industry, governmental agencies, community welfare agencies, and miscellaneous services afforded these youths challenge the imagination of the school personnel and the supporting community. It would be a joint enterprise in planning and in practice. There would be a place for them to still tie to, but not on the formal basis that we've got today – it's a freer going and coming.

3. In the case of college students expecting to continue in graduate school, reduce the four-year liberal arts program into three, and you'd never lose a thing for them either.

4. Remove the relentless competitive market system that brands those who have lost the school race before they start, the practice that eventually demands the extra funds for repetition. Research has shown long ago the ineffectiveness of retardation. Accept children on their own – not in relationship to others or to subjects. The comparative approach buttressed by achievement scores has the unfortunate psychological handicap that regardless of how much we raise the achievement of a particular group, half of those kids have to be below average. Who wants to be below average?

5. Establish procedures for learning that parallel the present single road through school, the reading of a book and the writing of a sentence. The outer school world is full of interesting learning gadgets used every day by children, whether they recognize them as education or not. At the secondary level, the student is never treated as a whole individual; he is as many different people as he has teachers in the school. We've got to get away from that. Social studies teachers often expect more written work of the child than the English teacher, when the English teacher is supposed to be the one who can help him in his writing. Throughout the school enterprise, change the emphasis from teaching the pupil to helping him, and thus the subject matter and courses will fall into place. When a child is required by law to go to school, the questions are not is he ready for school? or the next grade? or the next school? The question is – is the school or next grade ready for him?

6. Coordinate the funding of all public levels of education, thus determining the proportional amount of total school tax dollars that each segment deserves.

7. Since the professional athletics offer employment today, and it's a great field for some people, students who have athletic ability should not be excluded from participation because of lack of success in academic subjects. The high school student who is preparing for engineering does not have to succeed in athletics to be eligible to take the advanced course in mathematics or science that is leading him on to his profession. We shouldn't discriminate talent. In other words, take whatever ability and interest he has and build upon it. Don't mark it off as second rate in the school program. Don't place reading a book before the ability to put a basketball in a hoop. If the fellow's got that ability, let him make his million or so, and help him along with it.

8. For the sake of efficiency, both financial and educational efficiency, provide a high school schedule that places a student with a teacher of a given subject only the number of periods of the week by which he can profit.

You can see that we've got a lot of custodial duty. We don't know what to do with students in a high school if they're not under a teacher's nose. While some students need two or three periods with a teacher a week, others might need more than five. If we can only think flexibly, and not think in the standardized structure that we've been using for 100 years. It is quite understandable why our school practice, in contrast to those of other professions such as medicine and engineering, is so similar to the past. We are the only profession in which the trainee is indoctrinated and trained in the ways of his profession before entering a training institution. In other words, the only one in which the practitioner goes through the profession as a child and a youth. The doctor, dentist, and the engineer face training with an open mind, because when they enter their training institution they can get the new things that have come along; they don't know what the past was in medicine, or engineering, or dentistry, and so on.

And so I leave you with this ghost in the schoolhouse closet, as I call it – the ghost of the fact that we're all trained before we enter the training institution.

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Educational Reform in the Urban Society: Some Thoughts about Models

Edward J. Meade, Jr.

You've asked me here today to talk about the role of models in urban educational reform. As one who has had a good many years of experience in deciding whether or not to fund school projects of all kinds billed variously, according to one's preferred terminology, as models, beacons, lighthouses, or pilot projects, I'm not sure I can answer your expectations with wise advice about devising or adapting so-called model programs. The very word "model" implies, of course, that a tested structure and substance are to be duplicated. And we all know the familiar refrain of many urban school reformers proposing an innovative project, "Well, if the model works in the city, it will work anywhere."

I have come to feel, however, that to speak of models for reforming urban education is both presumptuous and over-simplified. I worry about the attitude which impels school people to invest expensively in either developing new model programs or copying another city's model (not that I condemn judicious adaptation of effective techniques, but I am wary of too rigorous application of models which deny the dynamics and realities of other, different contexts). What I would suggest rather is that we think of urban school reform not in terms of casting out the old and replacing it with the new, but with critical analysis of what works and what doesn't work and for what purposes. I'm suggesting that we examine the more basic conditions which give rise to the search for models.

Let me speak, therefore, to the issue of today's urban society, the character of our schools, and the relationships between the two. Obviously, that text sounds grandiose, even pompous. Let me assure you I have no grandiose ideas to advance. My aim is to propose a different way of thinking about adjusting urban school programs. In simple terms, my thesis is that schools are institutions rooted in stability; in urban settings, they coexist with pressures of change and diversity; yet, as preparatory agencies, they are a contradiction in terms if they do not help youngsters learn how to function in a changing society; and, finally, the confrontation between stability and change produces conflict. To resolve that conflict, schools must have the capacity to assess their work regularly and be prepared to recycle those features – be they content, teaching methods, or organizational structures – which are obsolete for new generations living in a fast-moving urban culture.

I do not want to sound like a futurist, but in fairness to our children, we ought to try to take stock of the prodigious contrast between the pace and preoccupations of the times when we grew up (assuming most of us are near or over forty) and the temper of today's scene, then ponder the rate of change we can expect between now and the year 2000. Let's recall how our world seemed around World War II. For one thing, our time and space horizons were still long; cross-country travel was still a matter of several days' train ride; radio was our only electronic means of mass communication, and even it was largely an entertainment medium, as was the moving picture. Commercial air travel and television had not collapsed distances to immediacy for the common man. Computers were still only embryonic brain children of scientists, and satellites just a gleam in their eyes. Manual typewriters were the ultimate in office efficiency; copying machines virtually nonexistent. Delay, prohibitive expense, and a human intermediary attended a long distance telephone call. While automobiles had become common and certain household electrical appliances were available for those who could afford them, we used them respectfully and did not turn them in for the latest model every year. The most advanced ground weapons were tanks. Urban growth was just then accelerating. Our awareness of social justice and cultural diversity was not aroused, preoccupied as we were with economic recovery from the depression years. In a matter of only a couple of decades, that quaint halcyon period dissolved as we absorbed dramatic technological, social, and cultural changes.

Today we find ourselves living in a predominantly urban environment, with a consciousness of world-wide perspective and a sense of limitless technological potentials. Our urban surroundings have brought us to working and living and traveling in close proximity to large numbers of our fellow man. Advances in transportation and communications technologies have stepped up the pace of our work and increased its flow. With the proliferation of new jobs has come ease of mobility; job changes are now regarded as essential to both satisfaction and growth. And it was our cities, in particular, that gave rise to the movements for civil rights and women's rights in vigorous action in the '60's. Today, racial, economic, and cultural disparities press for even greater attention. Our new communications media also have come to be instruments of social conscience, making visible and insistent a wider and deeper range of value-laden problems than most of us care to know about. Not only may we no longer ignore the rightful claims of racial and other minorities and women to unapologetic expression of their identities and fair economic reward, but, however threatening it may be to our creature comforts, we must turn our minds more and more to the claims of our grandchildren and unborn generations for a physical and social environment fit to live in. Ignorance is no longer an excuse for social irresponsibility.

Man being a highly adaptable animal, we have taken in stride the evolution of modern urban stress and change. But have we come to terms with it? Do our schools help youngsters come to terms with it? Sadly, I think the answer to both questions is "No." Yet I say that without pessimism. The same imperatives that are reorienting other social institutions — the judicial system, the political process, the family unit, the business firm — also are wearing away schools' resistance to change.

For all their trappings of modernity, such as guidance personnel, arts and media specialists, medical services, audio-visual facilities, and shop equipment, schools still try to hold out as bastions of stability. There is a sense in which they need to be just that, to offer a secure ground and a firm and nourishing medium in which young roots can grow. But stability in terms of preserving past attitudes is a disservice.

Now most of you are probably quietly disagreeing with what sounds like a put-down of schools' stability. Think for a minute, though, of how many features of the formal education system contribute to the perpetuation of a stable character for schools. There are buildings, for one thing. How often is a school building ever abandoned, even the oldest urban ones? New ones are added, but a school is built to last, the assumption being that what goes on inside it is unchanging. After all, there will always be pupils and, once they are of school age, they will have to have a place in school for a good many years; twelve years, by normal expectations. Then there are those who work in schools and the programs they devise for children's learning. By the development of a whole system of training, accreditation, tenure, and remuneration, the teachers and administrators in our schools are geared to a life-long commitment to a hierarchy of roles, as perceived when they were in training. And of course the basic content of school programs is conceded to be stable over time. Although other subjects have become entrenched, the heart of every school program still is reading, writing, arithmetic, science, history, geography, and civics. Even the order of presenting content is subject to little interference. We tinker with instructional methods a good deal, but those changes seldom unsettle the fundamental stability of the school.

So there is weighty evidence of the school's natural tendency to stand as a stable institution amid a tempestuous sea of change. Many of you might be thinking, "Ah, but ships at sea rely on the lighthouse's firm beam for safety." I agree, but they look to that lighthouse for guidance in navigating rough and strange waters, not for shelter.

So there, perhaps too simply, is my scenario of conflict: a restless, changing, mobile society in our cities and, withstanding the currents around them, relatively stable, staid, slow-changing education systems. While a little conflict and tension can be useful, I believe the strains in urban areas and urban schools are well past creative friction and almost to the point of blinding despair.

As Americans, we are inclined to want a clean answer — a yes or a no, a go or a no-go. We prefer sharp and clear alternatives. Should we therefore continue expecting that changing society adapt to the stable school? Or should we ask the school to adapt to the society? Put that way, the question answers itself. An older and wiser acquaintance, a school superintendent, once answered it by reminding his audience of who pays the bills.

The real answer is not quite so clearcut, though, for we must understand what changes and why, and what stability, for what. What is it that our urban schools need to hold fast in the waves of change our cities generate? Have we — those of us who in one way or another are responsible for shaping education — consciously thought about what needs to be solid in our schools and why? I suggest that, much as we have been exercised over the conflict between stability and change, we have done little to clarify what needs to remain stable and what ought to be changed.

A look at recent changes in urban schools documents my contention. As I reflect on the past decade or so of education in our cities, I find that we have begged my central question and, almost by default, have come up with two models for urban education, neither of which is anywhere near satisfactory for children or society, or even for us as educators.

The first of these so-called models I term the "add-on." As our urban society has become more diverse, or at least consciously admitted its cultural diversity instead of holding to the historical melting pot, the nation's schools responded with more and different programs. At first it was simply more — more dollars and more people to deal with more diverse people, interests, and backgrounds. In many ways, we in education thought that we could bring restless urban society back to the comfort of homogeneity that was, by simply overwhelming the diversity with remedial programs aimed at assisting kids to fit the schools. We labeled many of these early efforts "compensatory." By and large, they assumed that the corpus of our schools was in good health, but many so-called disadvantaged kids were not.

Later the "add-on" model became more sophisticated. It was not only more of the same. Rather, it started legitimizing new subject areas different from the stable fare of the school. Suddenly, and with the considerable assistance of an awakened federal government, we added on programs having their own identity and integrity — bi-lingual education, Afro American, black, and Chicano studies. And as work in our cities had become more specific and specialized, we added on courses and programs to meet those ends as well. Courses in art alone did not suffice. We atomized the field into separate, special-purpose branches — commercial art, industrial art, graphic art, advertising art.

Still, with all of the add-ons (you can think of many more examples) the school, in the main, stayed very much the same. True, it had more from which to choose; but frankly, the choices were ours more often than our children's. We were sure we knew all that was good for them.

As the change in city society continued at relentless pace, educators began to concede, however reluctantly, that perhaps the school alone could not deliver all that was expected of it. We decided that schooling needed to spread out at least minimally beyond the schoolhouse itself. We allowed that in some ways the community, particularly the urban community, had educational value. Thus emerged the newly-popular model I call the "spread-out."

Suddenly children found themselves not in schools all day, each day, but, instead, in factories, banks, museums, offices, even on the streets (and with the sanction of the school). With or without direction from teachers, they found themselves piecing together their own educational program from places and people in the world outside the stable school walls. "Relevance" was the rationale, and we rediscovered the meaning of old labels such as work-study. Exemplars of this "spread-out" model — "the Parkway Program" and the "community as a school" — quickly multiplied in urban areas. Education started spreading out. However, underlying this movement, too, is the assumption that such activities are ancillary or complementary to the school we know, our stable and secure school.

In some ways both models, the "add-on" and the "spread-out," lend themselves to the creation of a hybrid model, one that seeks to "individualize." But does either one or the hybrid really do that? Certainly by adding on or spreading out we allow for more diversity and choice. And certainly adding on and spreading out seem resposive to the mobility and changes prevalent in our cities. Unquestionably, too, individualizing education is more consistent with what we are coming to understand about the learning process, that its rate and bent are an individual matter. In fact, some are coming close to sanctioning "doing your thing" as the ultimate form of individualized learning. But is it? Hardly. Letting a youngster flounder, sink, or swim in the sea of change is no more a responsible answer than is anchoring the student in the artificiality of a stable environment when the world just is not like that.

What then should be stable about the school and what should be changed? You came here today to hear me develop a model for urban education, and I just might come close to fulfilling that obligation, but hopefully not in a rigid or insensitive fashion. Earlier I eschewed models for urban education, and later I criticized us for creating two by default. What then ought we to be thinking about if we shall ever expect to build models that stand a chance of resolving the conflict between the spirit of stability and that of change?

I believe there is a stable role for our cities' schools, but it is not the stability of buildings, facilities, programs, and people as we know them. Likewise, I believe that change is as essential for our schools as it is inevitable in our urban society. The delicate matter is what should be stable and what should be changed.

The primary role of any school, especially the urban school which is or soon will be the predominant school in our society, is helping children learn how to learn. That role is constant; it is stable; it should not be challenged or changed.

We educators will have failed if we do not assist children to master how to learn things, and to manage learning for themselves. Teaching them to know specific things is hardly education; educating children is to lead them to knowledge of the world and self. It is a matter of equipping them with the skills for personalizing any learning and for acquiring knowledge by themselves and within the context of others.

To my way of thinking, therefore, there is a need for stability in our schools in the sense of giving children structured and expanding experiences in learning keyed to the realities of the times. Certainly, it is simpler said than done, but nonetheless, it ought to be the unchanging and constant challenge, the prime objective.

A part of the school's proper stability is its service as a haven for the youngster as he ferrets out his values, his interests, his potentials, his person. Life affords few opportunities to test ourselves without suffering the possible consequences of such testing. It seems to me that the school, and especially in urban centers where change is rapid and more often unplanned than deliberate, needs to offer a stable ground where children may test and be tested without having to suffer the hardships of failure or the added responsibilities of success. It must afford a climate of support for critical self-assessment, a milieu where the outcomes of youthful experimenting feed further positive growth and development without the penalities that may attend risk-taking in the reality of the job place, the family, the community, and the society at large. Providing an internship for life is how I would like to think of schools performing.

How we go about that task, however, can be ever-changing. We need not attempt to hold stable our places, procedures, processes, programs, or people that serve learning. So long as we do no injustices to the children and the society we serve, our means should constantly be challenged and changed if there are better ways. But the ultimate injustice is holding on to traditions and practices that deny children fuller opportunities to learn. This says to me that the urgent, abiding, and unsparing agenda for school people is self-evaluation. Every facet of school life from curriculum to schedules to teacher training needs to be questioned. Is the way we are doing things now in keeping with work and life styles outside the school? In an era of liberation, in what ways does our educational system perpetuate mindless regiment action? What practices reflect sheer anachronisms? What traditional practices reflect valid concepts that need re-cycling into contemporary forms?

Perhaps a few examples of changes that we can (and probably should) make are in order.

First, school buildings and facilities need not be constructed to last forever, or even for a generation or two. Maybe we should consider such items as consumables that depreciate over limited time spans, just as factories, office buildings, homes, and equipment. The forms of learning will change, and our facilities need to either be adaptable to such changes or be replaced. Further, the location of our schools, especially city schools, may become removed over time from where the children are. School and educational facilities are to serve and not to be served. Bureaucratic procedures for processing books and consumable materials need to be lessened and emphasis redirected to the reason for such supplies — that of facilitating learning and not of insuring long life for the goods. Our procedures need to be efficient in terms of helping children learn, not in terms of our convenience or to gratify some antiquated rule of ancient bookkeepers.

Second, school procedures — those rules and regulations that govern our lives and, more specifically, those of the children — need to be in touch with the realities of life in the greater society. To illustrate, hall passes for high school children who are close to or already of voting age are demeaning. Pupil records that document trivial incidents of growing up need to be periodically assessed for their value with respect to their relationship to the development of the child and to our task of helping him to learn. It might be more meaningful to collect more reliable data about the child — his circumstances, his learning styles, his interests, his abilities — and less about his track record of consuming short-lived academic knowledge. After all, school is not a non-televised version of the $64,000 Question. And systems of marking and grades ought to bear on the individual and his competition with himself, not artificial competition with others with different strengths and weaknesses. Finally, we all know that there is no such thing as the third grade or the sophomore year. Organizational structures — our grade levels, our school organization — are administrative conveniences and nothing more.

Third, the processes of instruction we employ need to be as up-to-date as is our knowledge about learning and our technology to serve it. The blackboard and the book, once innovations, are now common. So should it and will it be with the computer, the television set, and the overhead projector. If learning can be more effectively and efficiently stimulated by such technologies, as their use outside the school implies, we should not deny their admission to formal schooling. If various systems of instruction all seem to work for at least some, then all must be available so that differences in learning styles can be accommodated and fulfilled. There is nothing sacred about any one instructional orthodoxy. That being the case, we should guard against the seduction by any one and employ all where they work. We need also to look at the time we ask people to devote to learning something. Ben Franklin once said, "Art is long and their time is short." Semesters and class periods may be no more realistic modules for learning than an agrarian-based school year — a true anomaly for an urban society.

Fourth, the programs, courses, or content for learning needs thorough review and freshening. It seems to me that we often fail to understand why something was put in the curriculum, but teach it because it is there. Content, like paper, should be recycled. Our goal in teaching any subject area is for the child to learn its fundamentals and its context — not all its content. The content, by and large, is the vehicle we use to build skills and understanding about literature, music, industrial arts, mathematics, science, and the like. Whether *Silas Marner* or *Death of a Salesman* is not important; the end it is used for is. Or should I say that regardless of the end product, be it a tie rack or a cutting board, the test is how well the maker understands the processes and tools involved.

Finally, there are the people, the educators, you and me. Are we unchanging in our own lives? Do we not embrace and accept changes in our personal styles of living? Of course we do, but in our professional endeavors are we readily flexible, open to new thinking? More often than not, we change jobs rather than ourselves, tenure notwithstanding. No school expects its faculty and staff to remain intact for a long period of time. Mobility is commonplace. Therefore, any school needs to create within itself ways and means to accommodate personnel changes without damage to children. Equally important, the school must insure continuing re-education of its personnel to meet the changing needs of children and society. We, too, need recycling and re-creation as professionals, as servers of learning. Helping learners is a demanding and tiring role. We cannot afford to fall into the safe rut of doing as we have always done nor let our colleagues do likewise. We need to create within our ranks an elite — hopefully the vast majority of us — who are constantly on the alert to find ways to improve our craft, knowing full well that the search will never end so long as there are new and different learners to be served.

In summary, then, education in the urban society is caught in a conflict of stability and change. Such a conflict, however, affords opportunity to think and analyze deeply on what to hold stable and what to change. With such awareness, ways and means to create adaptable systems — yes, and even models — may be possible.

Ironically, I set out this day not to propose a model — but I came close. Furthermore, I expected to focus on urban education — yet I spoke more on behalf of all schools. So be it.

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ACESIA

The Role of Industrial Arts in Career Education at the Elementary School Level

William A. Downs

The impact of industry and technology on our society's goals and values has caused our nation to reconsider the role of education. We are fast realizing that a society like ours, in which individuals are expected to enter the labor force and produce the goods and services needed, can no longer tolerate an educational system that largely ignores the world of work if it intends to accept its responsibilities to space-age youth. Since a person's work role does not limit his preparation in society, but provides a foundation upon which to build his life, then a comprehensive career education is a fundamental necessity for all who aspire to a productive, contributing, and satisfying role in this technically-oriented culture.

RATIONALE FOR CAREER EDUCATION

Those of us who are aware of the thousands of different occupations in existence in the United States today are quick to realize that the scope of career education is vast—far too broad, in fact, to be confined totally to the field of industrial arts. Within education, therefore, responsibility for career orientation does not rest solely with this segment of the total curriculum. However, it does play an important role in providing students with certain kinds of occupational information and knowledge as a basis for making realistic and significant career selections.

RESEARCH SUPPORTIVE OF CAREER EDUCATION

One of the most significant, if not the most significant research in the area of occupational (career) choice was conducted by Eli Ginzberg some years ago. Ginzberg's theory consists of three basic parts: (1) occupational choice is a process, (2) the process is largely irreversible, and (3) compromise is an essential aspect of every choice. If we accept these theories of occupational choice, and they have experienced wide acceptance over the years, then we need to realize that the process of choosing a career will take place whether or not children are provided with a well-organized, sequential, and systematic career education program. Career choice and preparation should be explicit —not accidental or circumstantial—through an increased understanding of self and career options and the implications for their career development. Elementary school children must therefore be given an orientation to careers because by the time they reach the secondary school, they will have formed some rather definite attitudes, whether positive or negative, toward a wide spectrum of the world of work.

Ginzberg has also identified three periods in the process of choosing a career which are: (1) fantasy choices (take place before the age of eleven), (2) tentative choices (take place between the ages of eleven and seventeen), and (3) realistic choices (take place between seventeen and young adulthood). The first period, the one involving fantasy choices, is the one that is of most concern to those of us who are interested in the role that industrial arts can play in career education at the elementary school level. The desire to work, dependability, adaptability, loyalty, cooperation, ability to accept responsibility, respect for the dignity of all kinds of labor, pride in accomplishment, and appreciation of quality workmanship are all factors which affect later success in the world of work. Elementary school industrial arts can cause factors such as these, as well as many others, to become very real and significant experiences for elementary school children.

INDUSTRIAL ARTS WITHIN CAREER EDUCATION

A variety of "hands-on" activities related to the world of work and integrated into the total curriculum as a continuous part of each child's schooling develops an awareness of the technological environment in which children must live and participate. Introduction to the basic concepts of work, the kinds and values of materials, and the organization and operation of industry are some of the major objectives of industrial arts at the elementary school level, as are the discovery of individual abilities, interests, and attitudes related to the world of work. The uniqueness of elementary school industrial arts lies in the fact that its "hands-on" activities can provide a greater variety of elements to enhance the career decision-making process than can any other single educational discipline. The more directly a student can explore and test his interests in a "true" work-type situation, the more relevant the content will become and the more perceptive he will be in deciding what elements of a given vocation do and do not appeal to him. Through the use of easy-to-form materials, children are provided an opportunity to express themselves creatively in the construction of two- and three-dimensional objects. From such endeavors, they not only benefit from the sheer joy of working with tools and materials, but they also benefit from the many opportunities for self-expression and self-discovery. In addition, considerable insight and interest are developed in manipulative activities which parallel those in their parents' "world of work."

In our study of careers, we must stress more than the skill or psychomotor domain. Too often we in the field of industrial arts have taught skills without giving due consideration to the cognitive and affective domains as well as the psychomotor domain, especially the humanizing aspects that are inherent in the affective domain. Career education must therefore provide the elementary child with not only an exposure to some basic skill activities relevant to the world of work, but it must also be designed to inform children about the wide range of careers as they relate to a knowledge and understanding of self. Career education should provide a means for making all elements of the school relevant to life purposes and stimulate interest and participation in the whole school enterprise.

SUMMARY

Elementary school industrial arts activities, unified with the existing elementary school curricular areas, can bring about wholesome changes in habits, attitudes, and understandings of and about the world of work, and can help to develop an interest in the man-made physical world through:

1. an evaluation of the learner's attitude toward work, self, and leisure.
2. a fundamental knowledge of how materials are processed and fabricated.
3. first-hand constructional experiences designed around a broad range of goods and services produced by man.
4. an understanding of the interrelationship of man with the tools and materials utilized in producing goods and services.
5. the development of a positive attitude toward creative thinking and problem solving.

I think that I can best summarize my concept of the role of industrial arts in career education at the elementary school level with the following example. As part of a unit of study centered around maritime careers, it was decided to construct a small boat or ship by using either an individual or group activity approach. During the process of constructing the water transportation vehicle, the learner should consider:

1. the contributions that maritime careers make to our society.
2. exactly what a maritime worker does.
3. what the work conditions are like.
4. what goods and/or services are produced by maritime workers.
5. who can qualify for maritime positions.
6. how beginning wages compare with those of other careers.
7. the source of raw material (wood in this case) used in the construction process.
8. all aspects of lumbering, tree farming, and conservation.
9. the great variety of workers who made it possible for the water transportation vehicle to be constructed.
10. leisure time activities that are available within forest regions.
11. which aspects of the construction industry are appealing to me.

Through this interdisciplinary approach to studying maritime careers, children will utilize not only mathematics and language arts skills, but will also gain insight into the economic, political, historical, and social aspects of careers. This, to me, is what career education is all about.

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The Role of Industrial Arts in Career Education at the Elementary School Level

Joseph L. English

A small fashion show is part of an introduction to the garment industry.

It's hard to cut a straight line.

Psychologically, scientifically, and technologically, an individual living in 1900 was closer to Rome 73 B.C. than to 1973 A.D. In the past 50 years, more changes have occurred than had occurred in the previous 50,000 years.

In terms of reality, remember that just 70 years ago the chief mode of transportation was a horse, and a good meal, including pie, cost 13¢. Today, however, we are living in a country where steak costs $2 a pound, and the average price for a full-size automobile is approximately $6,000. In light of these horrendous changes, one might ask—to what extent have our schools developed curricula to reflect this "cultural shock"?

Unfortunately, most educational institutions have not changed their teaching strategies to account for psychological and technological forces that have drastically altered the the educational needs of youth and adults who are living and working at a time in our history when change is occurring at an unprecedented rate. Many institutions mirror society by insisting that all students master an inordinate amount of innocuous information. The concept of holding students accountable for mastery of irrelevant knowledge is psychologically inconsistent. There exists a large body of data which suggests that if teachers were truly mindful of student needs, there would be an instantaneous shift in emphasis from dehumanizing academic curricula to psychological and vocational curricula with realistic individual goals and objectives.

Other factors also contribute to the dehumanization of our educational system, e.g., the absence of strong relationships between student grades and life experiences is partially due to the unreliability and invalidity of grading. These inconsistencies have cast doubts on the efficiency of traditional educational approaches.

CAREER EDUCATION

Career education is education which is sensitive to a constantly changing non-static world. In a realistic sense, specialized occupational clusters serve as a data base for curricular evolution, thereby making educational institutions initiators of change rather than static preservers of the status quo.

Although no clear-cut definition of career education is currently available, several characteristics have been isolated: first, if man is to survive on this planet, his educational system must become futuristically oriented with curricula developed from a non-static data base and second, because technology has caused a rate of change that is faster than the transmission of our culture from generation to generation, a giant gap has been created between what school provides and the actual needs of youth. In its simplest form, career education is providing new directions for humanistic educational needs of youth and adults living and working in a time when technological changes are completely reshaping the essence of man's existence on this planet.

To be oblivious to these changes by not absorbing obvious revolutionary concepts into our educational system is inconsistent with Jeffersonian democracy, and indeed, unworthy of the profession.

ELEMENTARY INDUSTRIAL ARTS—AN INDISPENSABLE DELIVERY VEHICLE FOR CAREER EDUCATION

It is academic at this point to discuss the relative merits of a full-time elementary industrial arts program with laboratories and specific time blocks versus the self-contained industrial arts experience provided by elementary teachers. However, there is general agreement that career education can be effectively delivered through an industrial arts type experience focusing on the "hands-on" experiential mode.

Traditionally, elementary industrial arts programs have functioned in a relative vacuum in relation to other school subjects. Similar criticism must also be directed to elementary math, science, English, and social studies programs within the present context of career education. The sad fact is that man's world is not departmentalized into one hour of English, industrial arts, or social studies. Unfortunately, educative processes conducted in school buildings have created an artificial dichotomy between the school and exciting realities occurring outside the classroom.

One logical fact that has practical significance for the role of industrial arts in career education is the development of an operational job description for elementary schools. Marvin Feldman has developed the following job description:

> The job of the elementary school, for example, should be to identify and develop a child's learning style and ability. It should perform both diagnostic and prescriptive services, using

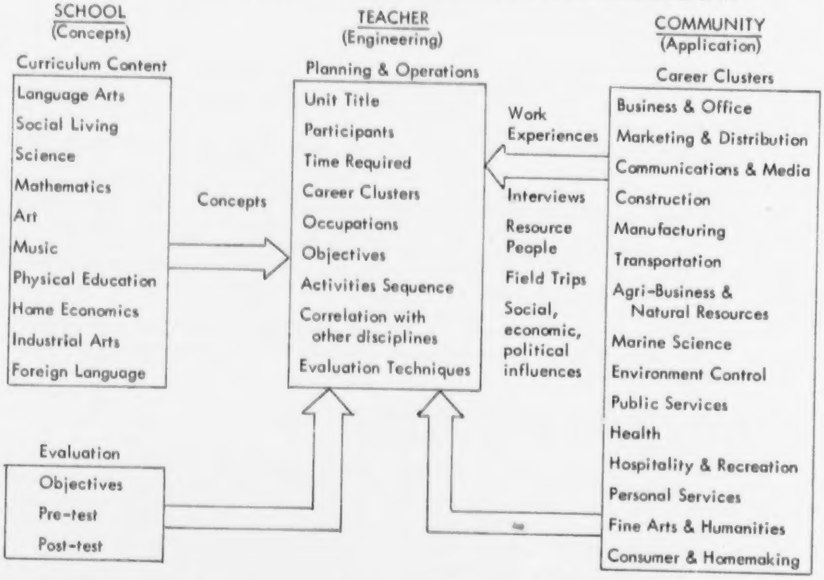
> whatever devices are necessary to make learning "real" to a child. It is pointless, for example, to have a youngster read, "Billy builds a boat," if he has never built or even seen one. The school has a responsibility to create learning experiences to which the child can react from his own environment. Finally, the school curriculum should begin to develop fundamental concepts about the world of work, including an awareness of the many options existing in the various fields of employment (Ref. 1, p. 115).

If elementary industrial arts is to contribute to career education, it must, by necessity, be given equal status with all other subjects. It will serve as a natural vehicle for child development by providing a totally integrated curriculum component to develop appreciation and attitudes, self awareness, decision-making awareness, educational awareness, career awareness, economic awareness, skill awareness, and competency with "basic subject" skills.

In terms of career education, it is apparent that industrial arts will lose a degree of identity, as will other subjects. Figure 1 graphically illustrates an elementary career education curriculum design model used for the developmental Elementary Career Education Programs. Interestingly, a triad of variables, school, teacher, and community, function as a data base with each component contributing to the child's educational experience.

Figure 1

A TRIAD MODEL FOR DEVELOPMENT OF CAREER EDUCATION LEARNING UNIT


SCHOOL
(Concepts)
Curriculum Content
Language Arts
Social Living
Science
Mathematics
Art
Music
Physical Education
Home Economics
Industrial Arts
Foreign Language
Concepts
TEACHER
(Engineering)
Planning & Operations
Unit Title
Participants
Time Required
Career Clusters
Occupations
Objectives
Activities Sequence
Correlation with other disciplines
Evaluation Techniques
Work Experiences
Interviews
Resource People
Field Trips
Social, economic, political influences
COMMUNITY
(Application)
Career Clusters
Business & Office
Marketing & Distribution
Communications & Media
Construction
Manufacturing
Transportation
Agri-Business & Natural Resources
Marine Science
Environment Control
Public Services
Health
Hospitality & Recreation
Personal Services
Fine Arts & Humanities
Consumer & Homemaking
Evaluation
Objectives
Pre-test
Post-test

Traditionally, schools have used only subject matter (mathematics, science, etc.) as a data base. However, career education mandates that the data base be expanded to include the work world as a means for providing children with some notion of why and what education is all about. The present dysfunctional nature of our educational arena indicates that traditional approaches to education have not worked for a vast majority of students.

Jerome Bruner cogently stated the need for educational reform due to the technological nature of our society when he stated:

> ....I cannot escape the conclusion that the first order of business in the transformation of our mode of educating is to revolutionize and revivify the idea of vocation or occupation (Ref. 2, p. 23).

Bruner's conclusion is shared by many educators; however, few have operationalized career education because they lacked a practical framework. Therefore, a sample learning unit is included in this paper to provide the reader with a concrete example of interdisciplinary career education. Industrial arts is an equal partner in the total elementary career development effort.

The following career development learning unit was developed by using a triad model for curriculum design (cf. Fig. 1).

CAREER DEVELOPMENT LEARNING UNIT

UNIT TITLE : Home Building
PARTICIPANTS : Level 3 - 32 students
(Average Age - 8 years)
TIME REQUIRED : 4 weeks - 40 hours
CAREER CLUSTERS: Construction, Marketing Distribution,
Transportation, Consumer & Homemaking.

OBJECTIVES:

1. The student will be able to list three types of homes. (single family, duplex, apartment, ranch, split-level, mobile)
2. The student will be able to list five occupations involved in home building. (architect, contractor, carpenter, plumber, electrician, roofer, painter, tile setter, mason)
3. The student will be able to name the steps involved in building a house. (foundation, exterior, interior)
4. The student will be able to identify materials involved in home building. (wood, metal, plastic, glass, rubber, concrete)

ACTIVITIES SEQUENCE:

1. Take a walk through the neighborhood observing types of houses and buildings.
2. Have each student draw a picture of his house.
3. Visit a house being built and have the contractor or carpenter tell about it.
4. Make a scrapbook showing types of homes.
5. Visit the lumberyard.
6. Visit the brickyard.
7. Visit county vocational-technical school.
8. Dramatize the building of a house.
    a. going to woods
    b. chopping trees
    c. hauling down the river
    d. floating down the stream
    e. talking to sawmill operator, owner, crew foreman, etc.
    f. building the house
9. Construct a model house

CORRELATION WITH OTHER DISCIPLINES

Language Arts

Write a describing paragraph about your house. Read books about related career (draftsman, engineer, carpenter, etc.)

Social Living

Dramatize a scene showing a typical family at home

Science

Electrical wiring (simple circuits, fuses, distribution, power)
Plumbing (energy transfer, sewage treatment)

Mathematics
Measuring to build the model house

Art
Drawing a picture of the house (landscape, etc.)

Music
Songs dealing with homes and home-building occupations—folk songs, etc.

Industrial Arts
Building and constructing using tools, materials, and industrial processes

EVALUATION TECHNIQUES:

A test measuring the objectives

From a psychological point of view, concrete experiences are the essence of elementary education; therefore, all elementary education is career education in the broadest sense, with industrial arts and other disciplines contributing to the total career development of children by providing interdisciplinary experiences vital to moral, psychological, and vocational growth.

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The Role of Industrial Arts in Career Education at the Elementary School Level

Harold G. Gilbert

In 1947 the American Industrial Arts Association met in Columbus, Ohio. I had the privilege of taking part in a panel discussion chaired by Dr. William E. Warner. The topic was An Industrial Arts Curriculum Reflecting Technology.[1] At that meeting many people talked about industrial arts reflecting technology, but not many people did anything about it. In 26 years this has changed. Today we all talk about it and do something about it to varying degrees—at least at the elementary school level.

Two major factors have influenced this change. First, many industrial arts teachers at the elementary school level are organizing their programs in terms of the basic units of transportation, construction, communications, power, and manufacturing because they fit so well into the elementary school curriculum. Second, the elementary schools are meeting the challenge of the United States Office of Education to do something about career education.

Outstanding examples of experimental programs like this are:

1. Cobb County Occupational and Career Development Program in Marietta, Georgia. They are combining team teaching methods with occupational studies.
2. The Learner-Oriented Occupational Materials Project at Florida State University. They are emphasizing "hands-on" or doing activities to study careers supported by industrial arts consultants.
3. The Technology for Children Project here in New Jersey. They have a demonstration as part of the program here.

4. The Technological Exploratorium project in Summit County, Ohio, also is part of the conference program.

The leadership in elementary industrial arts is moving in the direction of studying occupations, and the schools are following to varying degrees. Some teachers welcome the experimental programs to extend the materials they have been using, while others look to the research activities for means to update their programs.

The United States Office of Education has set a general direction for career education in the pamphlet, Career Education.[2] They emphasize 15 different clusters of occupational studies. The curriculum to reflect technology deals directly with four of these: manufacturing, communication, construction, and transportation. Some of the other areas are indirectly related; for example, hospitality and recreation, marine science, environment and natural resources.

I have had a limited time to examine the texts and resource material in the area of career education, but am disappointed in their scope. They deal with philosophy, justification, general organization, and need for this type of work. They do not provide any specific direction for the classroom teacher. Industrial arts can fulfill this need by making a major contribution to career education.

As I understand career education, it seems to deal with how people are employed. The United States Department of Commerce compiles monthly figures showing how all the people in the United States earn a living. It seems that these figures should be the core of the career education program. The Career Education pamphlet of the United States Office of Education makes no reference to these figures and does not indicate the source of the 15 clusters that they name.

The most extensive Department of Commerce publication is the Statistical Abstract.[3] A brief overview of the data on employment is given in this table:

Table I. 1968 Employment Status[3]

Non-institutional population, 16 and older	135,562,000 workers
Employees in nonagricultural establishments	67,860,000 workers
manufacturing	19,768,000 workers
wholesale and retail trade	14,081,000 workers
government	11,846,000 workers
services	10,592,000 workers
transportation and public utilities	4,313,000 workers
finance, insurance and real estate	3,383,000 workers
contract construction	3,267,000 workers
mining	610,000 workers
Farm population	10,454,000 workers

Industrial arts activities are directly related to manufacturing, transportation and public utilities, contract construction, and mining. Some services, like the 500,000 workers in auto repair, are directly related to industrial arts. Therefore, industrial arts activities relate to almost half of the employees in nonagricultural establishments. There is an indirect relationship to other areas, such as trade and government. Therefore, industrial arts can contribute to a large portion of career education.

To gain a more specific view of the relative importance of different career opportunities, the Department of Commerce references provide further data on employment. The information in Table II is taken from the three publications indicated by the footnotes for the table. If the major emphasis considered in curriculum planning is career education, the more important industries are the ones that employ more workers, so that is the number indicated in the table.

Teachers who are interested in coordinating their industrial arts programs with career education may use the figures in this table to show the specific relationship. These figures might be supplemented with others from the United States Department of Commerce to formulate a complete basis for a career education program, but the purpose here is to show how industrial arts can make a significant contribution.

There are other goals for a total program of industrial arts. This relationship to career education is currently of importance, but is not regarded as a complete program of industrial arts. However, at the present time industrial arts teachers can make a significant contribution to career education.

Table II. Workers in Areas of Industrial Arts

Industry	Workers	Reference	Industry	Workers	Reference
MANUFACTURING AREA					
Machinery—not electrical	1,936,000	5	Lumber, wood products	621,000	5
Food & kindred products	1,743,000	5	Furniture and fixtures	506,000	5
Fabricated metal	1,399,000	5	Leather, leather products	298,000	5
Apparel & textiles	1,351,000	5	Manufacturing, misc.	428,000	5
Primary metal	1,277,000	5	Ordnance, accessories	193,000	5
Chemicals	1,014,000	5	Hardware	170,000	6
Textile mill products	1,009,000	5	Corrugated, solid boxes	101,000	6
Stone, clay, glass	672,000	5	Tobacco manufacture	701,000	5
Rubber and plastic	649,000	5			
CONSTRUCTION AREA					
Building contractors	873,000	4	Veneer and plywood	72,000	6
Heavy construction	565,000	4	Logging camps, contractors	72,000	6
Plumbing, heating, a/c	371,000	4	Sheetmetal work	70,000	6
Highway and street	307,000	4	Metal doors, sash, trim	67,000	6
Construction machinery	295,000	4	Paint & allied products	66,000	6
Electrical work	241,000	4	Excavating, foundations	51,000	4
Electric lighting, wiring	209,000	4	Plastering and lathing	48,000	4
Household appliances	182,000	4	Structural steel erection	42,000	4
Masonry, stone work	144,000	4	Floor laying	38,000	4
Roofing, sheetmetal work	133,000	4	Terazzo, tile, marble	32,000	4
Painting, paper hanging	139,000	4	Installing bldg. equip.	19,000	4
Concrete	132,000	6	Water well drilling	14,000	4
Concrete work	83,000	4	Glass, glazing work	12,000	4
Carpentering	80,000	4	Wrecking, demolition work	10,000	4
COMMUNICATIONS AREA					
Graphic			Electronic		
Regular U.S. Post Office	546,000	4	Telephone	883,000	4
Newspapers	366,000	4	Communication equipment	525,000	4
Commercial printing	346,000	4	Radio, TV equipment	428,000	6
Paper, pulp mills	224,000	4	Electronic components	410,000	4
Paperboard contnrs., boxes	200,000	4	Radio, TV broadcasting	131,000	4
Books	97,000	4	Telegraph	32,000	4
Paperboard mills	73,000	4			
Blankbooks, bookbinding	51,000	4			
Periodicals	25,000	4			
TRANSPORTATION AREA					
Air			Land		
Aircraft	414,000	6	Trucking, warehousing	1,088,000	4
Transportation by air	351,000	4	Motor vehicles, equip.	901,000	4
Complete guided missiles	214,000	6	Railroads & equipment	688,000	4
Aircraft equipment	201,000	6	Passenger transit	283,000	4
Aircraft engines & parts	191,000	6	Water	235,000	4
			Ship & boat building	187,000	4
			Pipelines	19,000	4
POWER AREA					
Electric companies, systems	275,000	4	Motors & generators	107,000	6
Petroleum, coal products	190,000	5	Refrigeration machinery	103,000	6
Gas & electric companies	183,000	4	Fabricated platework	96,000	6
Transmission equipment	170,000	6	Switchgear, switchboard	65,000	6
Gas companies, systems	158,000	4	Plating, polishing	59,000	6
Measurement of power	130,000	6	Water, steam, sanitary	47,000	4

REFERENCES

(1) William E. Warner and others. A Curriculum to Reflect Technology. American Industrial Arts Association Feature Presentation April 25, 1947. Printed by Epsilon Pi Tau, Incorporated, Box 3111, Columbus, Ohio, 1965.

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(3) Statistical Abstract of the United States compiled by the United States Department of Commerce and sold by the Superintendent of Documents, 1970, 1018 p.

(4) Ibid., pages 220 and 668.

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(6) Industry Profiles, 1958-1968. United States Department of Commerce. Superintendent of Documents, United States Government Printing Office, November 1970, 297 pages.

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Curriculum Development for an Elementary Study of Technology

Norma Heasley

This presentation is based upon research that has been conducted through a Title III project entitled "A Technological Exploratorium, K-6." Much of the work that will be discussed is the result of the team effort of a small but very fine staff whom I will acknowledge during and after this presentation.

PHASE I – THE PLAN

Two and one-half years were spent in the development of the curriculum model which I am about to present. A proposal with views, goals, and expected outcomes was presented to the Title III Section of the Ohio Department of Education. Negotiations followed, and on August 15, 1970, the stamp of approval was given to the Summit County Board of Education, setting us in gear.

When one considers the evolution of curricula, our time has been minimal. However, if one compares in any way this evolution with our evolving technology, the accelerated rate of technological development compared with educational innovations must surely make educators gasp and grasp for new hope and direction.

Here, then, for your consideration is our model. We shall begin with the philosophical basis upon which we constructed our curriculum framework.

PHILOSOPHY FOR AN ELEMENTARY STUDY OF TECHNOLOGY

In a technological society, the acceleration of change challenges traditional education. What is relevant today may become obsolete tomorrow. Therefore, to enable the individual to assume a meaningful role in such a society, he must not only study his environment, but the "catalyst" of its evolution—man and his technology.

Contrary to the argument that technology is dehumanizing, it is of human creation. Man must first understand himself before he can thoroughly understand his endeavors, and through the study of his endeavors, he can better understand his purpose in life. Through the power of his imagination, man has the potential to willfully direct his technology to insure life's continuum!

The challenge of contemporary education is to realize and develop avenues the individual can use to explore and comprehend the forces that permeate his environment.

Elementary students involved in a study of technology can experience the environment as it is, so that they will be better prepared to shape their environment as it could be.

TECHNOLOGY AS A DISCIPLINE

If one thinks of technology as a discipline, major considerations must be made.

I. What knowledge should be gained?	(CONTENT)
II. What skills should be gained?	(BEHAVIOR)
III. How will understandings be gained?	(METHOD)

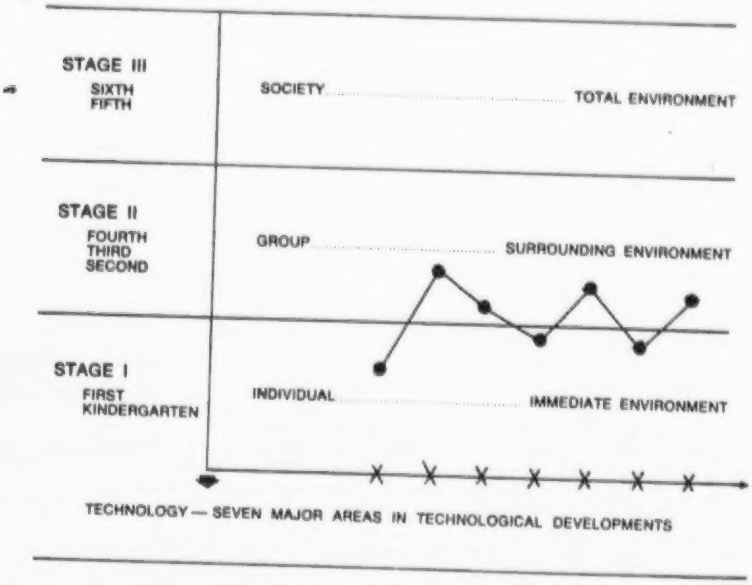
Technology, as a discipline, is interrelated with all other disciplines. The elements of technological concepts and generalizations form a complex pattern of relationships which provide a structure for the study. We have attempted to identify and logically relate prime conceptual understandings. These, then, may be used as tools by which meaning is lent to sets of facts. By using the concepts to analyze social situations, conclusions, and thus generalizations, may be derived. These generalizations may then be further combined to produce more inclusive generalizations about human behavior (Orlandi, as cited in Bloom et al., 1971). These are designed to provide a framework to aid the teacher and student in developing an understanding of technology.

Two main thrusts are represented within the scope and sequence of the conceptual hierarchy: the uniqueness of man and man's interactions with his environment.

The uniqueness of man is dealt with in the basic areas of communication, transportation, power, manufacturing, construction, service, and recreation. The selection of this scope is based upon its ready applicability to elementary-level educational endeavors and due to historical definition of these areas as significant facets in the study of technology (Warner, 1947; Olson, 1963).

Man's interactions with his environment present the sequential development for the technological exploration. The levels of this progression have been divided into three stages of understanding: the individual, the group, and the society. These stages provide a logical sequence which attempts to parallel the native mental development and social awareness of the learner (Piaget, 1952).

The following structure is felt to provide for a simultaneous flow of understanding through both the horizontal and vertical scope and sequence.



FUNDAMENTAL COGNITIVE SKILLS CLASSIFIED WITHIN SUBJECT AREAS

I — Introduce
D — Develop
R — Refine

LANGUAGE ARTS SKILLS

ACQUISITION of COGNITIVE SKILLS	K	1	2	3	4	5	6
Analyzing Words	I	I	D	D	D	R	R
Spelling Words	I	I	D	D	D	R	R
Defining Words	I	I	D	D	D	R	R
Using Words	I	I	I	D	D	D	R
Comprehending	I	I	I	I	D	D	D
Locating Information	I	I	I	I	D	D	D
Organizing Ideas	I	I	I	I	D	D	D
APPLICATION of COGNITIVE SKILLS	**K**	**1**	**2**	**3**	**4**	**5**	**6**
Expressing in Written Form	I	I	I	I	D	D	D
Expressing in Oral Presentations	I	I	I	I	D	D	D
Expressing Oneself Creatively	I	I	I	D	D	D	D

SOCIAL STUDIES SKILLS

ACQUISITION of COGNITIVE SKILLS	K	1	2	3	4	5	6
Listening	I	D	D	D	D	R	R
Observing	I	I	D	D	D	R	R
Communicating	I	I	D	D	D	D	R
Ordering	I	I	D	D	D	D	R
Classifying	I	I	I	D	D	D	D
Translating	I	I	I	D	D	D	D
Analyzing		I	I	I	I	D	D
Generalizing		I	I	I	I	D	D
Inferring		I	I	I	I	D	D
Predicting			I	I	I	D	D
APPLICATION of COGNITIVE SKILLS	**K**	**1**	**2**	**3**	**4**	**5**	**6**
Interacting for Decision Making and Problem Solving	I	I	I	I	I	D	D
Relating Relevant Information		I	I	I	I	D	D

MATH SKILLS

ACQUISITION of COGNITIVE SKILLS	K	1	2	3	4	5	6
Number Theory	I	I	I	I	D	D	D
Basic Operations	I	I	I	D	D	D	R
Measurement	I	I	D	D	D	R	R
Geometric Understanding	I	I	I	D	D	D	R
Statistics and Probability			I	I	D	D	D
Functions and Graphs			I	I	D	D	D
Logic	I	I	I	I	D	D	D
APPLICATION of COGNITIVE SKILLS	**K**	**1**	**2**	**3**	**4**	**5**	**6**
Problem Solving	I	I	I	D	D	D	D

SCIENCE SKILLS

ACQUISITION of COGNITIVE SKILLS	K	1	2	3	4	5	6
Observing	I	I	D	D	D	R	R
Classifying	I	I	I	D	D	D	D
Communicating	I	I	D	D	D	D	R
Generalizing		I	I	I	I	D	D
Inferring		I	I	I	I	D	D
Predicting			I	I	I	D	D
APPLICATION of COGNITIVE SKILLS	**K**	**1**	**2**	**3**	**4**	**5**	**6**
Hypothesizing	I	I	I	I	I	D	D
Relating Relevant Data		I	I	I	I	D	D
Operationalizing	I	I	I	I	I	D	D
Experimenting	I	I	I	I	I	D	D
Interpreting Data		I	I	I	I	D	D
Evaluating Results		I	I	I	I	D	D

The interdisciplinary approach characterizing this curriculum allows for the development not only of cognitive skills but also psycho-motor skills and affective states. The classification of the psycho-motor skills and affective states listed on the chart entitled Behavioral Skills Essential for Environmental Adaptation should be incorporated as a necessary and integrated part of the learning experiences involving the fundamental cognitive skills classified within all subject areas.

FUNDAMENTAL SKILLS CLASSIFIED WITHIN FINE ARTS SUBJECT AREA

ACQUISITION of SKILLS	K	1	2	3	4	5	6
Sensory Awareness	I	I	D	D	D	R	R
Psycho-Motor Movements	I	I	D	D	D	D	D
Aesthetic Awareness	I	I	D	D	D	R	R
Generating Ideas	I	I	D	D	D	R	R
Communicating	I	I	D	D	D	D	R
Recognizing Art Forms		I	I	I	D	D	D
Knowledge of: Resources	I	I	I	D	D	D	D
Knowledge of: Processes	I	I	I	I	D	D	D

APPLICATION of SKILLS	K	1	2	3	4	5	6
Expressing Oneself Creatively	I	I	D	D	D	D	D
Appreciating Art as Communication	I	I	I	D	D	D	R

Music | Literature | Visual
Dance | Drama | Arts

Psycho-motor movement skills and appreciation of the arts as a means of communication are major fundamental considerations for skill development in the area of fine arts. Therefore, these have been included within this structure.

Conceptual Strategy

STAGE III	MAN'S COMPREHENSION OF HIS CIVILIZATION THROUGH SYMBOLS AND COMPLEX SYSTEMS ALLOWS HIM TO UNDERSTAND THE BREADTH OF TECHNOLOGICAL ADAPTATION AND SHAPING OF THE ENVIRONMENT.	Man's growing complex technological society demands that he create new means of communication to transmit information further, quicker, and more effectively to broaden comprehension of the environment.	Man's growing complex technological society demands that he create new ways of conveying resources further, quicker, and more efficiently within the expanding environment.	Man's growing com technological societ demands that he fir new and more effic means of utilizing en
STAGE II	MAN'S INTERACTION WITH OTHERS ALLOWS HIM TO WORK WITH THEM IN THE BUILDING OF TECHNOLOGICAL MEANS OF SHAPING THE ENVIRONMENT.	Man's interaction with his fellow man creates the need for an efficient means of communicating about the environment.	Man's interaction with others creates the need for an efficient means of conveying resources within the environment.	Man's interaction wi others demands he harness energy to w for change upon the environment.
STAGE I	MAN'S UNIQUENESS ENABLES HIM TO UNDERSTAND AND SHAPE HIS ENVIRONMENT THROUGH TECHNOLOGY.	Man's unique sensory system enables him to communicate with his fellow man about his environment.	Man's unique nature enables him to move himself and his resources from place to place within the environment.	Man's unique natur enables him to harne energy and make it work for him in the environment.
	TECHNOLOGY IS A MANIFESTATION OF MAN'S INTELLECT AS DEVELOPED BY HIS ADAPTATION TO, AND SHAPING OF HIS ENVIRONMENT.	**COMMUNICATION** IS THE MEANS OF CONVEYING INFORMATION NECESSARY FOR ADAPTING TO AND SHAPING THE ENVIRONMENT.	**TRANSPORTATION** IS THE MEANS OF CONVEYING RESOURCES WITHIN THE ENVIRONMENT.	**POWER** IS THE RA AT WHICH ENERG IS USED BY MAN TO PERFORM WOR TO SHAPE HIS ENVIRONMENT.
	TECHNOLOGY	**COMMUNICATION**	**TRANSPORTATION**	**POWER**

The breadth and depth of experiences for learning throughout the conceptual progressions are determined by the skills and competencies of any individual and/or groups of students.

SKILLS FOR LIVING

> Considering man's evolution, principal emphasis in education should be placed upon skills —skills in handling, seeing, imaging, and in symbolic operations, particularly as these relate to the technologies that have made them so powerful in their human expression. (Bruner, 1966, p. 34)

Education is the prime factor for a learner to acquire and apply knowledge and skills. Skills are tools that allow him to more effectively adapt to, manipulate, and change his environment to meet his needs. Relevant learning will provide the child skills not only to endure his ever-changing environment but to determine, direct, and control his experiences within this environment. The relevancy of his education then is not only the learning of skills, but also the learning of how to apply these skills.

Conceptual Strategy

an's growing complex technological society demands at he create new means of manufacturing and roducing commodities more quickly and efficiently to lapt to a rapidly expanding environment.		Man's growing complex society creates new needs for service expertise to handle the unique demands evolving from a technological environment.	Man's expanding technological society provides increasing leisure time for him to find means of self fulfillment and enjoyment of the environment.
lan's interaction with his fellow man demands a eans of producing commodities necessary for daptation to the environment.		Man's interaction with his fellow man to achieve expanded mastery over the environment creates the need to distribute individual efforts.	Man's interaction with his fellow man allows him collective means of enjoying the environment.
lan's unique mental capabilities and physical tructure enables him to create tools for more ffective adaptation and shaping of the environment.		Man's unique nature enables him to employ others in his adaptation to the environment.	Man's unique nature enables him to provide the time to play with his environment for his own enjoyment.
IANUFACTURING IS HE SYSTEMATIC ROCESS FOR RODUCING OMPONENTS AND OMMODITIES ECESSARY FOR DAPTING TO AND CTING UPON THE NVIRONMENT.	**CONSTRUCTION** IS THE BUILDING AND MANIPULATION OF COMPONENT PARTS TO BETTER ADAPT TO THE ENVIRONMENT.	**SERVICE** IS A FUNCTION PERFORMED BY INDIVIDUALS TO HELP OTHERS IN THE ADAPTATION TO AND SHAPING OF THE ENVIRONMENT.	**RECREATION** IS MAN'S UTILIZATION OF HIS LEISURE TIME FOR SELF-FULFILLMENT AND THE ENJOYMENT OF HIS ENVIRONMENT
MANUFACTURING	**CONSTRUCTION**	**SERVICE**	**RECREATION**

A myriad of factors contribute to the complexity of the educator's roles and responsibilities to students. In order to be a contributor to the learning process, teachers must analyze and organize information and skills into "systems for understanding." These systems then become the teacher's tool for planning meaningful experiences.

The elementary curriculum is traditionally "locked in" to certain basic fundamental skills necessary for educational progress. The main concerns, traditionally, are the development of reading and math skills. Tragically, in many instances, the child's mastery level of these skills will determine his success or failure as measured by the traditional educational establishment.

Realizing that these skills will remain of significant importance now and of increasing importance in the future, we have analyzed the basic skills in each fundamental subject area and have decided at what level these skills should be introduced, developed, and refined. In keeping with elementary curriculum development, in most instances, we have followed usual practice. However, in some cases we have introduced skills at a much younger age. This has happened because the design of our program has indicated that students are ready to acquire skills earlier.

BEHAVIORAL SKILLS ESSENTIAL FOR ENVIRONMENTAL ADAPTATION

	ACQUISITION of COGNITIVE SKILLS						APPLICATION of COGNITIVE SKILLS																			ACQUISITION of PSYCHO-MOTOR SKILLS				APPLICATION of PSYCHO-MOTOR SKILLS				ACQUISITION of AFFECTIVE STATES			APPLICATION of AFFECTIVE STATES			
							MANIPULATION of IDEAS										MANIPULATION WITH IDEAS UPON the ENVIRONMENT																							
							HEURISTIC of PROBLEM SOLVING										RESEARCH			DEVELOPMENT																				
	KNOWLEDGE*	COMPREHEND	SYNTHESIZE	ANALYZE	EVALUATE		IDEATE/CREATE	RECOGNIZE PROBLEM	HYPOTHESIZE	RELATE RELEVANT INFORMATION	COLLECT DATA	EVALUATE RESULTS	GENERALIZE	INFER	PREDICT		RESEARCH	DESIGN (ABSTRACT)		PLAN (CONCRETE)	PROCURE	CONSERVE	UTILIZE	CONSTRUCT		REFLEXIVE MOVEMENTS	BASIC FUNDAMENTAL MOVEMENTS	PERCEPTUAL ABILITIES		PHYSICAL ABILITIES	SKILL MOVEMENTS	NON-DISCURSIVE COMMUNICATION			RECEIVING AND ATTENDING		RESPONDING	VALUING	ORGANIZATION	CHARACTERIZATION
R	I	I					I	I									I	I		I				I		I	I	I		I	I	I			I		I	I		
1	I	I	I	I	I		I	I	I	I	I	I	I	I			I	I		I		I		I		I	I	I		I	I	I			I		I	I		
2	I	I	I	I	I		I	I	I	I	I	I	I	I	I		I	I		I		I	I	I		D	D	D		D	D	I			D		I	I	I	
3	D	I	I	I	I		I	I	I	I	I	I	I	I	I		D	I		I	I	I	I	I		D	D	D		D	D	I			D		D	D	I	
4	D	D	I	I	I		D	D	I	I	I	I	I	I	I		D	D		D	D	D	D	D		D	D	D		D	D	D			D		D	D	I	
5	D	D	D	D	D		D	D	D	D	D	D	D	D	D		D	D		D	D	D	D	D		R	R	R		D	D	D			R		D	D	D	I
6	D	D	D	D	D		D	D	D	D	D	D	D	D	D		D	D		D	D	D	D	D		R	R	R		D	D	D			R		R	D	D	I

We have followed the thinking of authorities in the field of child development/educational development to design a matrices entitled "Behavioral Skills Essential for Environmental Adaptation." These are the skills specifically essential not only to a study of technology but to the development of a "thinking" individual.

Projecting for the "real" present and future world, we shift our emphasis to problem-solving skills and application of these skills. Problem solving implies the use of the acquired skills and acting in some way to "logically" make decisions. By analysis, the Fundamental Skills and our Environmental Adaptation Skills have common components. The differences occur in the method used to acquire skills. Concrete, real experiences give relevancy to the application of skills.

CONTENT AND METHOD

The major goal of the project is the development of a curriculum model which enables educators to provide those avenues to the individual student so that he may realize his greatest potential. The student is challenged and motivated through experiences designed for developing thinking, comprehending, and reasoning skills in an academically-technologically oriented "school within life" environment.

Interdisciplinary units of study have been designed to develop understandings of the relationships of man, society, and technology. They contain behavioral objectives, skills, and experiences that support the sequentially-developed conceptual strategy.

Integrated throughout the units of study are multi-sensory activities designed to provide the teacher the medium to develop skills in the cognitive, psycho-motor, and affective domains, thus enhancing the total development of the learner. The nature of the activities place the individual student and teacher in the "real" environment by utilizing creativity and problem-solving techniques for the achievement of goals.

The units of study serve as guides and references which supplement the teacher's skills and sensitivity towards education, providing a foundation upon which the creative teacher can utilize available sources to innovate dynamic educational experiences.

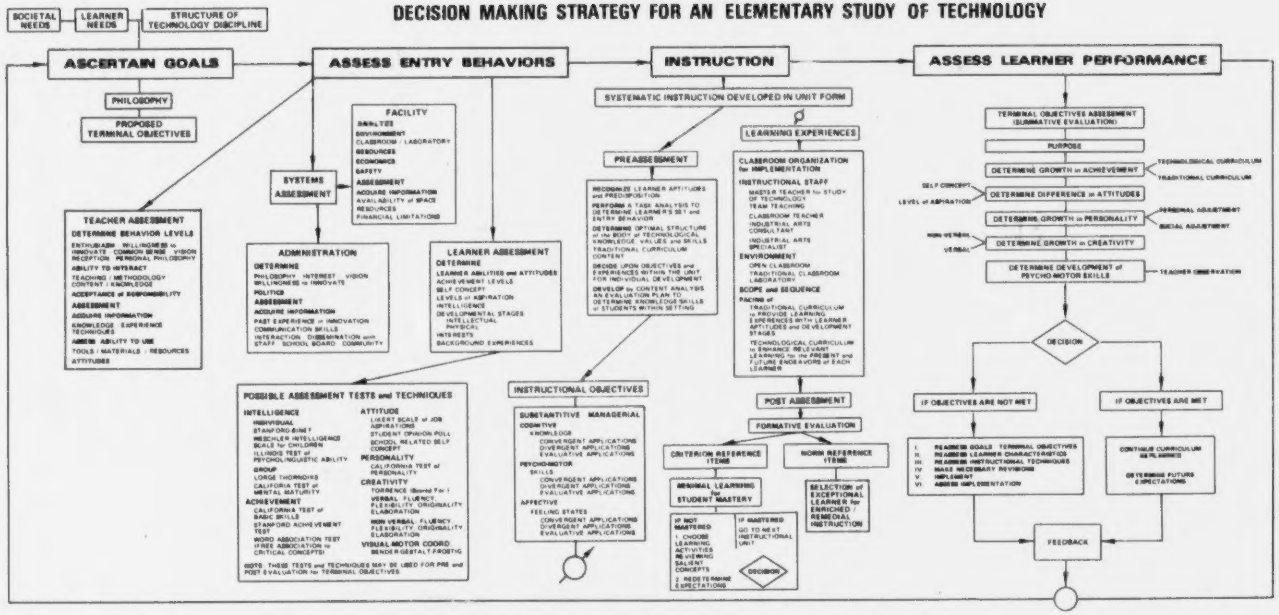
The genesis of study must be child-teacher-child originated. With this understood, the units afford the classroom teacher a vehicle to develop academic disciplines through experiences relevant to the learner. The basic premise of the curriculum model developed by the Technological Exploratorium is the utilization of technology as a medium by which the learner can explore his world.

Only through a well-designed strategy for evaluation can you determine the worth of a curriculum. The decision-making strategy flow chart shows areas which should be given major considerations.

SEQUENCE for UNIT CONTENT
(BASED on MAN SHAPING his ENVIRONMENT through TECHNOLOGY)

DEVELOPMENTAL STAGES	LEVELS	BROAD SUBJECT AREAS
III	6	EFFECTS of TECHNOLOGY on MAN and SOCIETY
	5	EVOLUTION of TECHNOLOGY
II	4	INTERPRETING THE ENVIRONMENT THROUGH TECHNOLOGICAL DEVELOPMENTS
	3	UNDERSTANDING HUMAN INTERACTION THROUGH TECHNOLOGY
	2	TECHNOLOGY and the INDIVIDUAL'S ENVIRONMENT
I	1	TECHNOLOGY and the INDIVIDUAL
	K	INTRODUCTION to TOOLS, MATERIALS, RESEARCH and DEVELOPMENT
	EMR PNH INH	A STUDY OF TECHNOLOGY for CHILDREN WITH LEARNING DISABILITIES

DECISION MAKING STRATEGY FOR AN ELEMENTARY STUDY OF TECHNOLOGY


SOCIETAL NEEDS
LEARNER NEEDS
STRUCTURE OF TECHNOLOGY DISCIPLINE
ASCERTAIN GOALS
PHILOSOPHY
PROPOSED TERMINAL OBJECTIVES
ASSESS ENTRY BEHAVIORS
INSTRUCTION
ASSESS LEARNER PERFORMANCE
TEACHER ASSESSMENT
DETERMINE BEHAVIOR LEVELS
ENTHUSIASM WILLINGNESS to INNOVATE COMMON SENSE VISION RECEPTION PERSONAL PHILOSOPHY
ABILITY TO INTERACT
TEACHING / METHODOLOGY CONTENT / KNOWLEDGE
ACCEPTANCE of RESPONSIBILITY
ASSESSMENT
ACQUIRE INFORMATION
KNOWLEDGE EXPERIENCE TECHNIQUES
ASSESS ABILITY TO USE
TOOLS / MATERIALS / RESOURCES
ATTITUDES
SYSTEMS ASSESSMENT
FACILITY
ANALYZE
ENVIRONMENT
CLASSROOM / LABORATORY
RESOURCES
ECONOMICS
SAFETY
ASSESSMENT
ACQUIRE INFORMATION
AVAILABILITY of SPACE
RESOURCES
FINANCIAL LIMITATIONS
ADMINISTRATION
DETERMINE
PHILOSOPHY INTEREST VISION WILLINGNESS to INNOVATE
POLITICS
ASSESSMENT
ACQUIRE INFORMATION
PAST EXPERIENCE in INNOVATION
COMMUNICATION SKILLS
INTERACTION DISSEMINATION with STAFF SCHOOL BOARD COMMUNITY
LEARNER ASSESSMENT
DETERMINE
LEARNER ABILITIES and ATTITUDES
ACHIEVEMENT LEVELS
SELF CONCEPT
LEVELS of ASPIRATION
INTELLIGENCE
DEVELOPMENTAL STAGES
INTELLECTUAL
PHYSICAL
INTERESTS
BACKGROUND EXPERIENCES
POSSIBLE ASSESSMENT TESTS and TECHNIQUES
INTELLIGENCE
INDIVIDUAL
STANFORD-BINET
WESCHLER INTELLIGENCE SCALE for CHILDREN
ILLINOIS TEST of PSYCHOLINGUISTIC ABILITY
GROUP
LORGE THORNDIKE
CALIFORIA TEST of MENTAL MATURITY
ACHIEVEMENT
CALIFORNIA TEST of BASIC SKILLS
STANFORD ACHIEVEMENT TEST
WORD ASSOCIATION TEST (FREE ASSOCIATION to CRITICAL CONCEPTS)
ATTITUDE
LIKERT SCALE of JOB ASPIRATIONS
STUDENT OPINION POLL
SCHOOL RELATED SELF CONCEPT
PERSONALITY
CALIFORNIA TEST of PERSONALITY
CREATIVITY
TORRENCE (Scored For:)
VERBAL FLUENCY, FLEXIBILITY, ORIGINALITY, ELABORATION
NON VERBAL FLUENCY, FLEXIBILITY, ORIGINALITY, ELABORATION
VISUAL-MOTOR COORD.
BENDER-GESTALT-FROSTIG
NOTE: THESE TESTS and TECHNIQUES MAY BE USED FOR PRE and POST EVALUATION for TERMINAL OBJECTIVES
SYSTEMATIC INSTRUCTION DEVELOPED IN UNIT FORM
PREASSESSMENT
RECOGNIZE LEARNER APTITUDES and PREDISPOSITION
PERFORM A TASK ANALYSIS TO DETERMINE LEARNER'S SET and ENTRY BEHAVIOR
DETERMINE OPTIMAL STRUCTURE of the BODY of TECHNOLOGICAL KNOWLEDGE, VALUES and SKILLS
TRADITIONAL CURRICULUM CONTENT
DECIDE UPON OBJECTIVES and EXPERIENCES WITHIN THE UNIT FOR INDIVIDUAL DEVELOPMENT
DEVELOP by CONTENT ANALYSIS AN EVALUATION PLAN TO DETERMINE KNOWLEDGE SKILLS of STUDENTS WITHIN SETTING
INSTRUCTIONAL OBJECTIVES
SUBSTANTITIVE MANAGERIAL
COGNITIVE
KNOWLEDGE
CONVERGENT APPLICATIONS
DIVERGENT APPLICATIONS
EVALUATIVE APPLICATIONS
PSYCHO-MOTOR
SKILLS
CONVERGENT APPLICATIONS
DIVERGENT APPLICATIONS
EVALUATIVE APPLICATIONS
AFFECTIVE
FEELING STATES
CONVERGENT APPLICATIONS
DIVERGENT APPLICATIONS
EVALUATIVE APPLICATIONS
LEARNING EXPERIENCES
CLASSROOM ORGANIZATION for IMPLEMENTATION
INSTRUCTIONAL STAFF
MASTER TEACHER for STUDY OF TECHNOLOGY
TEAM TEACHING
CLASSROOM TEACHER
INDUSTRIAL ARTS CONSULTANT
INDUSTRIAL ARTS SPECIALIST
ENVIRONMENT
OPEN CLASSROOM
TRADITIONAL CLASSROOM
LABORATORY
SCOPE and SEQUENCE
PACING of
TRADITIONAL CURRICULUM to PROVIDE LEARNING EXPERENCES WITH LEARNER APTITUDES and DEVELOPMENT STAGES
TECHNOLOGICAL CURRICULUM to ENHANCE RELEVANT LEARNING for the PRESENT and FUTURE ENDEAVORS of EACH LEARNER
POST ASSESSMENT
FORMATIVE EVALUATION
CRITERION REFERENCE ITEMS
NORM REFERENCE ITEMS
MINIMAL LEARNING for STUDENT MASTERY
SELECTION of EXCEPTIONAL LEARNER for ENRICHED / REMEDIAL INSTRUCTION
IF NOT MASTERED
1. CHOOSE LEARNING ACTIVITIES REVIEWING SALIENT CONCEPTS
2. REDETERMINE EXPECTATIONS
IF MASTERED
GO TO NEXT INSTRUCTIONAL UNIT
DECISION
TERMINAL OBJECTIVES ASSESSMENT (SUMMATIVE EVALUATION)
PURPOSE
DETERMINE GROWTH in ACHIEVEMENT
TECHNOLOGICAL CURRICULUM
TRADITIONAL CURRICULUM
SELF CONCEPT
LEVEL of ASPIRATION
DETERMINE DIFFERENCE in ATTITUDES
DETERMINE GROWTH in PERSONALITY
PERSONAL ADJUSTMENT
SOCIAL ADJUSTMENT
NON VERBAL
VERBAL
DETERMINE GROWTH in CREATIVITY
DETERMINE DEVELOPMENT of PSYCHO-MOTOR SKILLS
TEACHER OBSERVATION
DECISION
IF OBJECTIVES ARE NOT MET
IF OBJECTIVES ARE MET
I. REASSESS GOALS TERMINAL OBJECTIVES
II. REASSESS LEARNER CHARACTERISTICS
III. REASSESS INSTRUCTIONAL TECHNIQUES
IV. MAKE NECESSARY REVISIONS
V. IMPLEMENT
VI. ASSESS IMPLEMENTATION
CONTINUE CURRICULUM AS PLANNED
DETERMINE FUTURE EXPECTATIONS
FEEDBACK

The evaluation model used in the Technological Exploratorium curriculum reflects both Tyler's (1951) and Shaplin's (1961) viewpoint. The model is concerned with:

a) clarifying objectives, both terminal and instructional.
b) determining entry behavior necessary for attaining objectives.
c) the development of activities which should result in achievement of instructional objectives.
d) assessment of instructional objectives to determine student progress.
e) assessment of terminal objectives to determine curriculum revisions and directions.

In line with the Tabian philosophy, at all times the learner is considered the prime concern of the educational process. Therefore, the emphasis has been placed on this focal point in the evaluation structure. However, there are many other elements in the educational system that affect decisions in curriculum development. An attempt has been made herein to identify some of the more obvious elements.

PHASE II IMPLEMENTATION

The elementary schools in Hudson, Ohio, were selected to field-test the proposed research. Formal work began on August 15, 1970. Because the ten experimental teachers had no background in this area, two weeks were spent in summer training to build a philosophical understanding for utilizing industrial arts in elementary education. Project goals were reviewed, and structures were set up to begin planning for classroom experiences.

The school year began. Teachers were released from their classroom duties one day a month to work with the industrial arts coordinator and to do research to gain knowledge in material and tool areas. A program of in-service training was established, and regularly-scheduled meetings involved the teacher in experiences with tools, materials, and processes.

The teachers received training in the following areas: woods, metals, plastics, graphic arts, ceramics, leather, electricity/power, textiles, safety, and classroom organization. Movies, field trips, and resource consultants were utilized to relate the teacher's experiences to man's utilization of technology. These procedures have continued throughout the project and are considered essential to provide the teacher with the necessary background for classroom implementation.

Equipment suitable for elementary school children was selected, and four classrooms were chosen for initial experimentation (kindergarten, sixth, educable mentally retarded, intermediate neurologically handicapped).

The students became involved in a variety of multi-sensory activities ranging from the complex analysis of transportation to individual discovery experiences. The total school and community became the environment from which the students drew resources.

Behavioral changes in motivation, cooperation, communication, interests, attitude toward school, and self discipline became apparent almost immediately. The classroom environment became more conducive to learning.

The academic disciplines took on new dimensions for the student as he applied knowledge and skills for the solution of problems that were "real" to him.

EVALUATION

Experimental and matched control groups for each level were selected. The groups are heterogeneous, with abilities and achievements ranging from very high to very low. Extensive pre-testing took place under the direction of an evaluation expert and a team of psychologists and aides.

The following tests were administered at the appropriate grade levels:

California Test of Basic Skills
California Achievement Test
Short Form Test of Academic Aptitude
California Test of Personality
Likert Scale of Job Aspirations
A Student Opinion Poll
Verbal and Non-Verbal Sections of the Torrance Creativity Test
A Project-Designed Word Association Test.

Kindergarten students were screened for motor skill development and visual, auditory, and language memory, verbal intelligence quotients were determined by the Peabody Picture Vocabulary, and maturity by the Evanston Early Identification Scale (Draw a Man).

The neurologically handicapped and educable mentally retarded children were previously given several tests by psychologists and neurologists; therefore no formal testing was done.

The evaluation results have shown that:

Of 20 significant results in the major sub-scales, 18 showed higher results for the experimental than the control. Also, trends were indicated across grades in these results.

Most of these tests were more personality and affectively oriented than cognitive. The results indicate that the children in the experimental groups are, in general, doing better than the control groups in these areas.

The analysis of pre- and post-testing results on the California Test of Basic Skills in grades 4, 5, and 6 (reading and math only) show no significant differences between experimental and control groups on any of the variables at any grade level. All analyses, however, do show a gain from pre- to post-testing.

It is important to note that the Technological Exploratorium was not implemented into most classrooms until late February or early March and that the post-testing was conducted in early May.

In general, various components of personality seemed to benefit from the experimental program. This seems to be in agreement with the many laudatory comments made by parents.

Tests have been developed for the project and are now in the validation phase. These are technology achievement tests at both the primary and intermediate levels. A Word Association test has been developed, and a paper entitled "Adapting Word Association for Use as an Evaluation Technique" has been presented at the American Education Research Association Meeting in New Orleans, February 1973.

To date we've had many favorable responses to our endeavors. Positive reactions by parents and the community have offered encouragement. Teachers not involved in the project have shown interest and are independently trying many activities developed by the project in their classrooms. A university that previously had no course of study in this area has developed a curriculum for such a study. Many university staff and students are continuously involved in our research. Student teachers have been placed in the experimental classrooms. Professors in the elementary education department are producing video tapes of project activities for use in their classrooms. Project staff members have been invited to speak to various groups. Educators and interested individuals have visited the project and are writing about the project. Brodhead-Garrett Company has printed a set of teaching aids produced by the project which are featured in the March-April Issue of "Curriculum Product Review" by McGraw-Hill.

In closing, I wish to emphasize that the Technological Exploratorium is not project-oriented but product-directed, and those products are adaptable children who will be shaping the world in the year 2000. If children can learn to apply their skills and knowledge to the solution of problems in the school environment, they will be better able to adapt to changes and problems in any environment. Man's greatest challenge is realizing the forces of his technology and controlling them to meet human needs. His greatest tool for meeting this challenge is his education.

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ACKNOWLEDGMENTS

Van Buren, Donna	Assistant to the Project Director Summit County Board of Education
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Kutina, Eugene	Industrial Arts Specialist Summit County Board of Education
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System Commitment to K-6 Career Education: A Strategy for Implementing Technology for Children

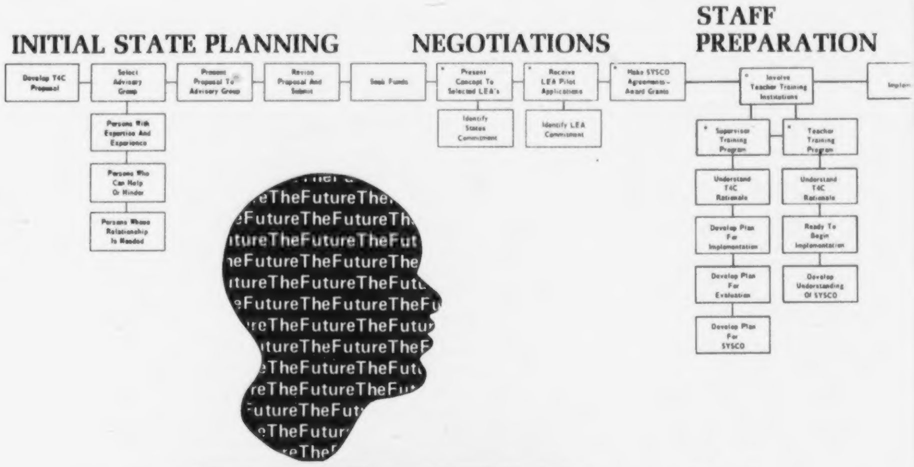
Richard B. Harnack

Technology for Children—New Jersey's elementary school phase of career education—is intended for all children, and it is gratifying to see this intention rapidly becoming a reality.

Implementing Technology for Children has become a serious problem because the project has expanded at a rate which nearly doubled enrollments during each of the past three years, and doubling will occur again in the current year. At the present rate of expansion, practically every New Jersey elementary school district will be involved in the program by 1980.

A STRATEGY FOR IMPLEMENTATION,
OF THE TECHNOLOGY

*Appropriate item for dissemination as public information. **


INITIAL STATE PLANNING
NEGOTIATIONS
STAFF PREPARATION
Develop T4C Proposal
Select Advisory Group
Persons With Expertise And Experience
Persons Who Can Help Or Hinder
Persons Whose Relationship Is Needed
Present Proposal To Advisory Group
Revise Proposal And Submit
Seek Funds
* Present Concept To Selected LEA's
Identify States Commitment
* Receive LEA Pilot Applications
Identify LEA Commitment
* Make SYSCO Agreements - Award Grants
* Involve Teacher Training Institutions
* Supervisor Training Program
Understand T4C Rationale
Develop Plan For Implementation
Develop Plan For Evaluation
Develop Plan For SYSCO
* Teacher Training Program
Understand T4C Rationale
Ready To Begin Implementation
Develop Understanding Of SYSCO
Implem
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EVER
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DRY

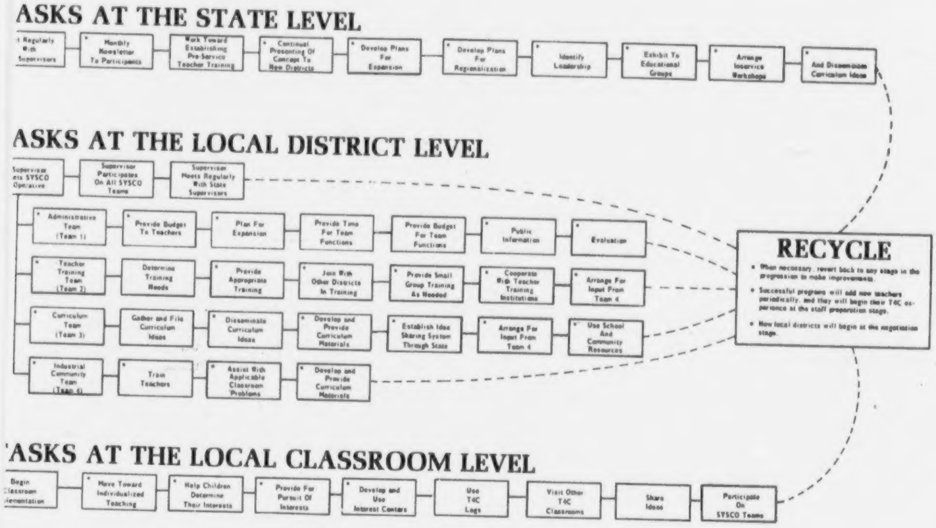
ANSION & CONTINUOUS IMPROVEMENT
R CHILDREN PROGRAM

d simultaneously or somewhat out of sequence depending on needs or circumstances

ASKS AT THE STATE LEVEL

ASKS AT THE LOCAL DISTRICT LEVEL

ASKS AT THE LOCAL CLASSROOM LEVEL


t Regularly With Supervisors
* Monthly Newsletter To Participants
Work Toward Establishing Pre-Service Teacher Training
* Continual Presenting Of Concept To New Districts
* Develop Plans For Expansion
* Develop Plans For Regionalization
* Identify Leadership
* Exhibit To Educational Groups
* Arrange Inservice Workshops
* And Disseminate Curriculum Ideas
Supervisor ets SYSCO Operative
Supervisor Participates On All SYSCO Teams
Supervisor Meets Regularly With State Supervisors
* Administrative Team (Team 1)
* Provide Budget To Teachers
* Plan For Expansion
Provide Time For Team Functions
Provide Budget For Team Functions
* Public Information
* Evaluation
* Teacher Training Team (Team 2)
Determine Training Needs
* Provide Appropriate Training
* Join With Other Districts In Training
* Provide Small Group Training As Needed
* Cooperate With Teacher Training Institutions
* Arrange For Input From Team 4
* Curriculum Team (Team 3)
Gather and File Curriculum Ideas
* Disseminate Curriculum Ideas
* Develop and Provide Curriculum Materials
* Establish Idea Sharing System Through State
* Arrange For Input From Team 4
* Use School And Community Resources
* Industrial Community Team (Team 4)
* Train Teachers
* Assist With Applicable Classroom Problems
* Develop and Provide Curriculum Materials
RECYCLE
Begin Classroom lementation
* Move Toward Individualized Teaching
* Help Children Determine Their Interests
* Provide For Pursuit Of Interests
* Develop and Use Interest Centers
Use T4C Logs
Visit Other T4C Classrooms
Share Ideas
Participate On SYSCO Teams

- When necessary, revert back to any stage in the progression to make improvements.
- Successful programs will add new teachers periodically, and they will begin their T4C experience at the staff preparation stage.
- New local districts will begin at the negotiation stage.

Apparently, local teachers and the children themselves have accepted and benefitted from the three objectives of the program: (1) to encourage growth in self-awareness; (2) to encourage learning about the kinds of things people do to earn a living; and (3) to enhance interdisciplinary approaches to learning.

Out of T4C's experiences of rapid but solid expansion has come an awareness of a workable procedure for implementing the program on an ever-increasing scale.

Commitment and sharing are the basis for the acceptance and success of T4C. The program succeeds to the degree that everyone involved is committed to the program and is willing and able to share it with others.

The strategy can best be described as a set of relationships proven desirable over a period of time, through which the basic commitment and sharing can be expressed.

The state has a definite role to play in this strategy. The local administrator and local classroom teacher each have other roles which are equally important. However, the basic condition for implementation at every level remains commitment and sharing. Each of these roles will be described later as they fit together into a strategy which works because it has been refined by teachers, administrators, and state staff who have been open to discovering a better way.

STATE LEVEL STRATEGY

For a state to initiate a T4C program effort, a proposal will undoubtedly need to take form. The groundwork for such proposal writing will involve gathering information by visiting operating T4C programs, consulting knowledgeable persons, and studying their writings.

An initial draft of a project proposal should be reviewed by an Advisory Committee of concerned persons. These are the kinds of persons that should be invited to participate in such a committee:

- Persons with specific expertise in elementary school career education.
- Those whose help will be needed to make the proposal into a reality.
- Knowledgeable and influential teacher educators.
- State Department of Education personnel.

On the basis of the Advisory Committee's reactions and suggestions to the initial draft of the proposal, a revised proposal should be developed and submitted for approval and possible funding.

During the period when the project proposal is being developed, the state project initiator should become familiar with the instructional situations throughout the state by visiting local elementary school classrooms. Such visits can reveal schools or classrooms which indicate a close matching with the concept of Technology for Children. The success of pilot projects can best be assured by awarding grants to districts already demonstrably interested and active in similar approaches.

While funding is being sought, an awareness campaign should be launched by the state project director. The goal would be to present the proposal to selected local districts whose implementation and whose thinking have indicated compatibility with the proposal. Presenting the T4C idea has the very practical purpose of soliciting both funding applications and voluntary participation.

THE CONTRACT SETS THE CONDITIONS FOR LOCAL STRATEGY

Before awarding grants to local districts, both the state and the local district must have a clear concept of what is required or expected in terms of commitment. The state must make clear the kinds of support it will offer, and it must also make clear the things it will expect from the local district in return for that support.

SYSTEM COMMITMENT (SYSCO) IS THE CORE OF LOCAL STRATEGY

Having agreed to provide a local T4C supervisor, funds for classroom implementation, and teacher training, the local district agrees also to use a specific organizational structure for continued T4C program improvement and expansion. This commitment is referred to as "SYSCO" and used for improvement and expansion because of its proven effectiveness.

In organizing "SYSTEM Commitment" (SYSCO), four teams are needed:

Team One: Administrative Team

STATE OF NEW JERSEY
DEPARTMENT OF EDUCATION
DIVISION OF VOCATIONAL EDUCATION
TRENTON 08625

LOCAL DISTRICT COMMITMENT AGREEMENT WITH TECHNOLOGY FOR CHILDREN

Local School District of ____________________________ agrees to the following negotiation factors upon participation in technology for children.

DATE ________________ SIGNATURE ____________________________

ITEMS OF AGREEMENT

1. Commitment of three hundred dollars ($300) per teacher, per year, for a minimal number of teachers to insure success.

2. Commitment of a T4C Supervisor (principal or a person carrying some administrative authority). This person (or a designated substitute) will be expected to attend 6 - 7 meetings during the year on a monthly basis.

3. Commitment to implement System Commitment (SYSCO) in the individual school or district and to demonstrate a willingness to assist in setting up state, regional and county organizations.

The local administration in agreement with Item 3 has appointed:

________________________ (name) ________________________ (title)

as T4C Supervisor for our district.

At this time, we request training for ________ teachers. Each of whom are backed by local funds (Item 2).

DO NOT WRITE BELOW THIS LINE

________________ Date Received

_______ State Funded _______ LEA Funded

Return this Commitment to:

Dr. Kenn Charlesworth
Associate Director - T4C
State Department of Education
Division of Vocational Education
225 West State Street
Trenton, New Jersey 08625

Team Two: Teacher Training Team
Team Three: Curriculum Team
Team Four: Individuals, Organizations, or Agencies of All Kinds in the Community.

The tasks of each of the teams are sketched below.

TEAM ONE: Administrative Team has the following functions:

* Provides over-all leadership to local T4C implementation.
* Makes the initial decision to commit themselves and their district to T4C.
* Provides time needed for necessary teacher training.
* Provides a budget for individual classroom expense.
* Provides a budget for substitutes so that new T4C teachers might be released to participate in a teacher training program.
* Meets needs for public relations.
* Provides time for the other SYSCO teams to function and for their work to be implemented.
* Provides evaluation.

Who might best serve on the Administrative Team? The local T4C supervisor is the organizer of all teams, and therefore participates in a leadership capacity on each. Usually T4C supervisors are building principals, but in those cases where they are not, the principal should be encouraged to participate on the team. High-level administrators, whose approval is necessary to accomplish T4C objectives, should definitely be asked to participate. A representation of classroom teachers helps to ensure that team decisions reflect all educational levels in the school system.

The T4C supervisor is the key initiator at the local level. It is, therefore, very important in a local situation that T4C begin only after complete training of the supervisor.

TEAM TWO: Teacher Training Team is responsible for coordinating teacher training efforts of the local district and in assisting teachers to receive training beyond the initial state-sponsored programs. Some specific tasks of this team are as follows:

* Planning for and implementing in-service training programs.
* Keeping colleagues informed of relevant externally-sponsored training programs which may be available through colleges, neighboring school districts, or other organizations.
* Developing and implementing a routine system of in-service training.
* Arranging for individuals and small groups to receive training in areas of their choice and request.
* Developing and maintaining a file of training help available from Team Four. (Individuals, organizations, or agencies of all kinds from the community.)

This team should be composed of those with an interest in teacher training and who have a contribution to make.

TEAM THREE: Curriculum Team exists to provide a source of ideas for classroom implementation. Flexibility and creativity in performing this function are important. One school's curriculum team works this way:

* Every month each T4C teacher selects the most successful classroom activity.
* Each activity is jotted down on a 5 x 9-inch file card.
* Cards are filed and made available to interested persons.
* Inquiries are referred to the teacher who submitted the idea to avoid extensive reading or prolonged research.

This team will also want to: keep current on printed curricula developed by other districts, by the state T4C agency, or by commercial publishers, make suggestions and keep teachers and administrators informed of their findings, and report classroom developments to the state T4C agency for sharing with other districts.

TEAM FOUR: Individuals, Organizations or Agencies of all kinds in the community contribute to T4C in many ways. Team Four is not so much an organized team as a set of personal inputs helpful to the purposes of T4C. Examples are:

* Vendors who offer educational service as well as materials.
* Hobbyists.
* Professional persons.
* Craftsmen.

- Businessmen.
- Retired persons.
- High school students.
- Teachers with a hobby, specialty, or expertise.

Contributions by Team Four should be logged by either Team Two or Team Three, depending on whether the input relates to teacher training or curriculum.

Teams One, Two, and Three should meet regularly. Early meetings of teams should be geared to identifying and achieving tasks. When possible, teachers should be given released or free time at regular intervals to participate on these teams.

CONTINUED PROGRAM GROWTH IS A NORMAL RESULT OF EFFECTIVE LOCAL STRATEGY

A local district usually initiates T4C with five or six teachers in the expectation that T4C will gradually expand into more classrooms. As "System Commitment" (SYSCO) is in operation, the first attempts of teachers to work with interest centers and encourage student responsibility for learning will be reinforced and assisted through the team actions. Other teachers should become interested. Open communications, widespread participation, and local initiative are important for the commitment and sharing so basic to T4C growth.

The yearly doubling growth pattern of New Jersey T4C is an encouragement for local and state leaders to accept the strategy sketched here for implementing this program. We are calling this strategy "System Commitment" (SYSCO). Call it what you like, but do include provisions for administrative support, teacher training, curriculum concerns, and community assistance—and you are on the same path which has helped T4C in its undeniable success in New Jersey and in other states during the last six years.

Mr. Richard B. Harnack is the Assistant Director of Technology for Children, Division of Vocational Education, State Department of Education, Trenton, New Jersey.

ACIAS

Administrators and Supervisors of Industrial Arts

John E. Bonfadini

All supervisory positions, whether in industry or education, require some basic characteristics in working with other personnel. These characteristics can be classified into the following subheadings: (1) gaining respect of people; (2) effective listening to people; (3) solving problems; (4) practicing the "Golden Rule"; (5) controlled temper and emotions; (6) providing motivation; (7) providing of examples; (8) individually knowing people; (9) effectively communicating; and (10) being able to forgive and forget. These ten commandments were published by Richard Pinegar, Manufacturing Supervisor of Western Electric Company, in the Industrial Supervisor's Magazine, June 1971. In this article, Mr. Pinegar expounded on these points, giving supervisors additional knowledge and ideas as to their effective implementation.

The most important thing in supervision is gaining the respect of individuals who work with or for you. This can best be done through admiration rather than fear and requires an openness between employer and employees. Respect will be enhanced if the individual is an effective listener. On many occasions, individuals possessing solutions to problems try to convey all the answers to an individual without properly listening to his problem. Letting people talk is one of the best ways of having problems rise to the surface where they can be dealt with effectively and efficiently. The supervisor must solve problems. This should be done in a professional manner, and when questions are raised, answers must be given. A supervisor who is unable to solve problems will have very little effect on developing attitudinal changes within his employees. Practicing the "Golden Rule" needs no explanation; it is a basic fact to a successful profession. Controlling your temper and emotions is a difficult task for many people. Experienced men usually have learned to effectively use their emotions to motivate people in changing attitudes and work habits. Being a motivator is a very difficult task.

Motivation means providing people with the opportunity to develop leadership qualities within themselves. A pat on the back is often the best way of receiving more production

Figure 1

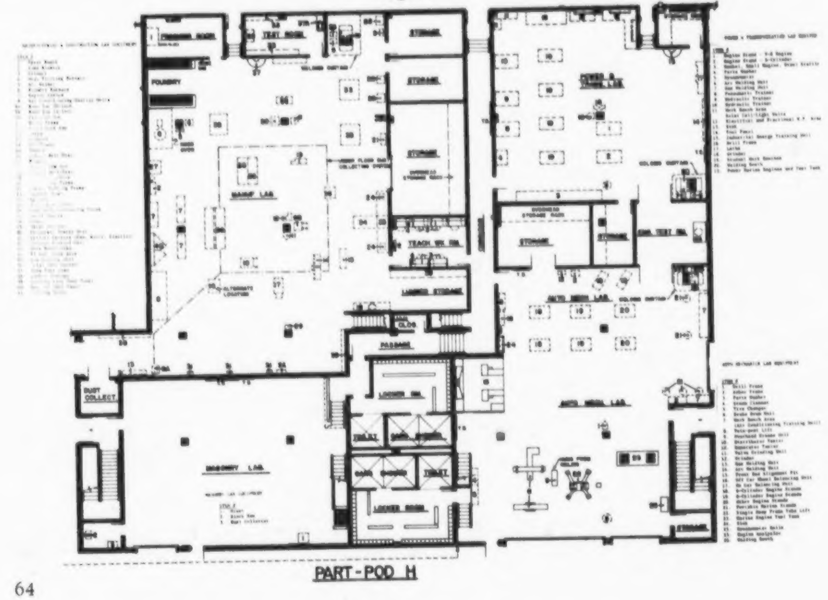
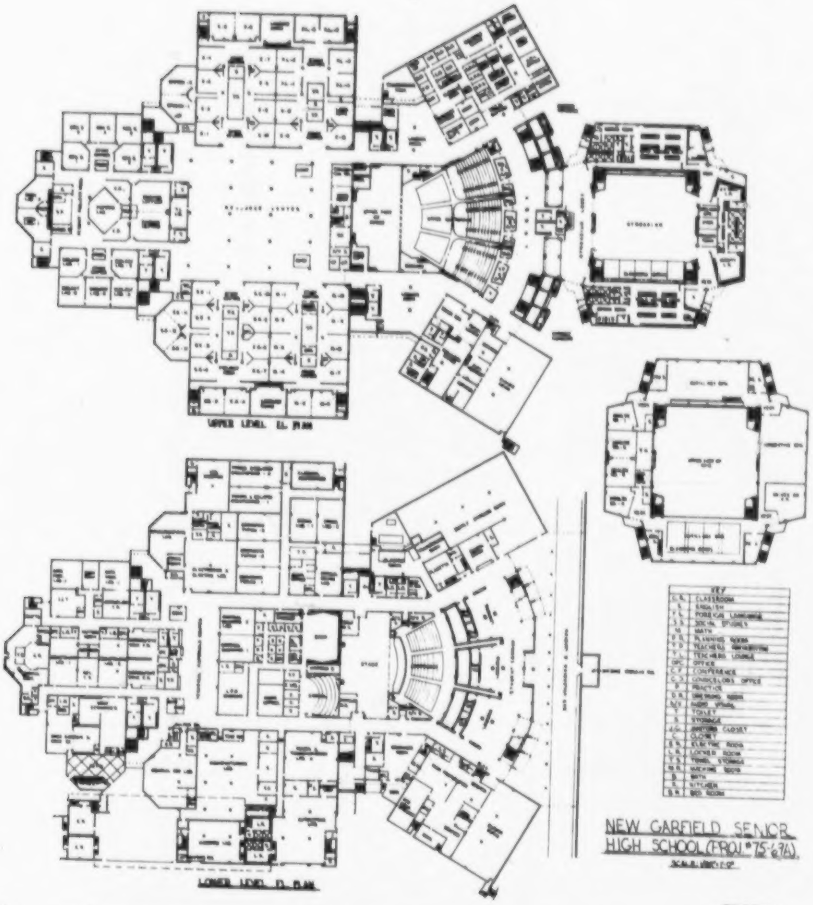
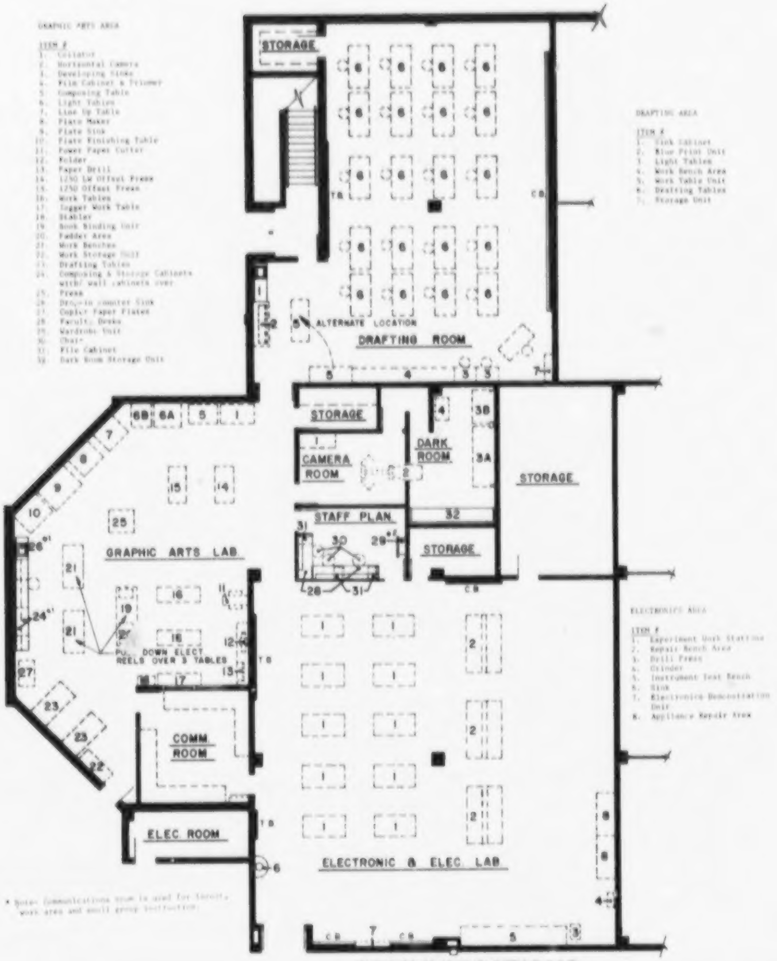


Figure 2


UPPER LEVEL FL. PLAN
LOWER LEVEL FL. PLAN
KEY
C.R. CLASSROOM
E. ENGLISH
F.L. FOREIGN LANGUAGE
S.S. SOCIAL STUDIES
M. MATH
OFC. OFFICE
C.F. CONFERENCE
C.O. COUNSELORS OFFICE
P. PRACTICE
D.R. DRESSING ROOM
T. TOILET
S. STORAGE
J.C. JANITORS CLOSET
C. CLOSET
E.R. ELECTRIC ROOM
L.R. LOCKER ROOM
B. BATH
K. KITCHEN
B.R. BED ROOM
NEW GARFIELD SENIOR
HIGH SCHOOL (PROJ.#75-674)

from teachers or work personnel. A highly motivated individual automatically transfers his motivation to other people, through an instinctive process and not one that is falsely presented. The word "communications" cannot be overstressed in education. An open atmosphere where all lines of communications are used can provide administrators with a solidified staff relationship. Communications and personality go hand in hand; supervisors should always realize that their every movement, word, or action communicates a certain thought to their employees. The supervisor's skill in analyzing how his employees perceive his movements will enhance his over-all effectiveness and further develop his communicating abilities. Other points such as knowing every person individually and being able to forgive and forget are golden rules for the successful operation of any business, and education is a business.

Many of the previous ten commandments have been broken by the industrial arts profession in their dealings with vocational education. Our failure as supervisors and administrators to take a positive approach when working with vocational education has created many deep and slow-healing wounds. The new generation of industrial arts teachers have different feelings about vocational education, and their older colleagues should

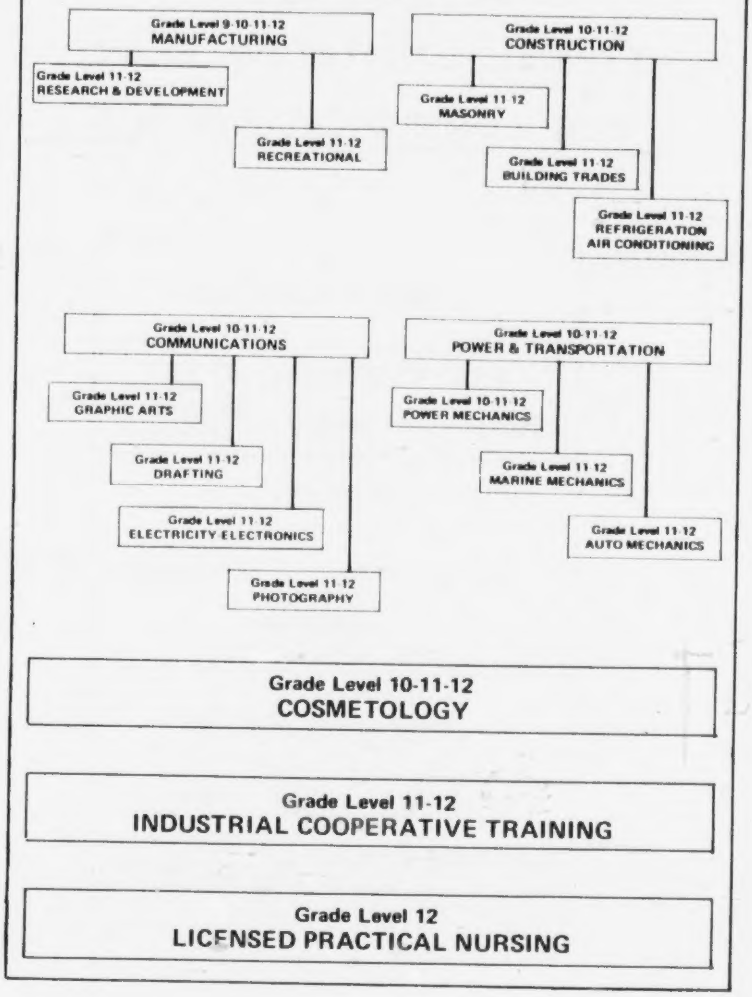

GRAPHIC ARTS AREA
ITEM #
1. Collator
2. Horizontal Camera
3. Developing Sinks
4. Film Cabinet & Trimmer
5. Composing Table
6. Light Tables
7. Line Up Table
8. Plate Maker
9. Plate Sink
10. Plate Finishing Table
11. Power Paper Cutter
12. Folder
13. Paper Drill
14. 1250 LW Offset Press
15. 1250 Offset Press
16. Work Tables
17. Jogger Work Table
18. Stapler
19. Book Binding Unit
20. Padder Area
21. Work Benches
22. Work Storage Unit
23. Drafting Tables
24. Composing & Storage Cabinets with/ wall cabinets over
25. Press
26. Drop-in counter Sink
27. Copier Paper Plates
28. Faculty Desks
29. Wardrobe Unit
30. Chair
31. File Cabinet
32. Dark Room Storage Unit
DRAFTING AREA
ITEM #
1. Sink Cabinet
2. Blue Print Unit
3. Light Tables
4. Work Bench Area
5. Work Table Unit
6. Drafting Tables
7. Storage Unit
ELECTRONICS AREA
ITEM #
1. Experiment Work Stations
2. Repair Bench Area
3. Drill Press
4. Grinder
5. Instrument Test Bench
6. Sink
7. Electronics Demonstration Unit
8. Appliance Repair Area
STORAGE
DRAFTING ROOM
ALTERNATE LOCATION
STORAGE
CAMERA ROOM
DARK ROOM
STORAGE
STAFF PLAN
STORAGE
GRAPHIC ARTS LAB
PULL DOWN ELECT REELS OVER 3 TABLES
COMM ROOM
ELEC ROOM
ELECTRONIC & ELEC LAB
TB
CB
* Note: Communications room is used for faculty work area and small group instruction.

COMMUNICATIONS PART- POD E

Figure 3

honor their right to a more flexible outlook by accepting industrial arts as a part of the total over-all vocational plan. Our past history has led us to use a rather vague term called general education which has numerous definitions and is somewhat like the term "motherhood"; it's hard to be against. Our failure to relate to the vocational field is puzzling to most people. It's obvious to most administrators and supervisors on the local and state levels that cooperation is the basis for successful industrial arts programs in the future. Although we in the industrial arts areas should not accept all the fault for the lack of communications between these areas, we cannot honestly say that we have extended ourselves to show the fullest extent of cooperation. It is time for us to bring in the "forgive and forget" commandment and work for a joint program that will benefit all youngsters in all areas of education. The inclusion of industrial arts in the vocational act and its amendments should assist us in accomplishing this goal.

Figure 4. Program Guide


Grade Level 9-10-11-12
MANUFACTURING
Grade Level 11-12
RESEARCH & DEVELOPMENT
Grade Level 11-12
RECREATIONAL
Grade Level 10-11-12
CONSTRUCTION
Grade Level 11-12
MASONRY
Grade Level 11-12
BUILDING TRADES
Grade Level 11-12
REFRIGERATION
AIR CONDITIONING
Grade Level 10-11-12
COMMUNICATIONS
Grade Level 11-12
GRAPHIC ARTS
Grade Level 11-12
DRAFTING
Grade Level 11-12
ELECTRICITY-ELECTRONICS
Grade Level 11-12
PHOTOGRAPHY
Grade Level 10-11-12
POWER & TRANSPORTATION
Grade Level 10-11-12
POWER MECHANICS
Grade Level 11-12
MARINE MECHANICS
Grade Level 11-12
AUTO MECHANICS
Grade Level 10-11-12
COSMETOLOGY
Grade Level 11-12
INDUSTRIAL COOPERATIVE TRAINING
Grade Level 12
LICENSED PRACTICAL NURSING

Originators of state plans should become more creative in meshing the two programs to provide an effective educational pattern for children. The career education concept provides an excellent vehicle for the meshing of these programs, and any supervisor who is truly interested in the over-all development of the child will soon realize that his individual programs must become second to the specific individual needs of the child.

The Prince William County School System has attempted to merge the vocational trades and industry programs with the industrial arts programs at the senior high level into one package that will provide students with an over-all technological concept followed by the opportunity to gain specific skills in a vocational trade. The high schools mentioned here are comprehensive high schools of approximately 3000 students containing both in-

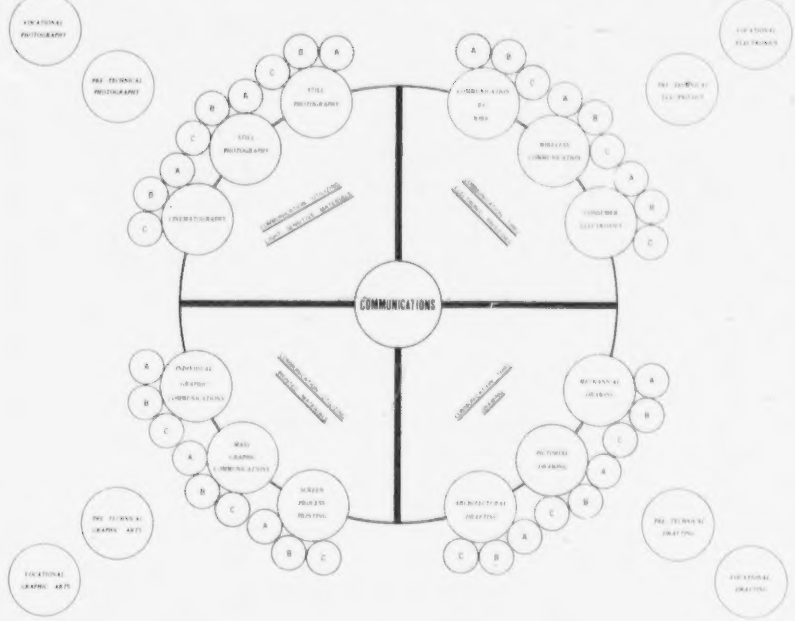
Figure 5

TYPICAL UTILIZATION CHART FOR COMMUNICATIONS POD

PERIODS		HRS.
1	COMMUNICATIONS	1
2	PRE-TECHNICAL AREAS ELECTRONICS - GRAPHICS - MECHANICAL DRAWING	1
3 4	VOCATIONAL GRAPHIC ARTS ELECTRONICS DRAFTING	2-3
5	COMMUNICATIONS	1
6	PRE-TECHNICAL AREAS ELECTRONICS - GRAPHICS - MECHANICAL DRAWING	1

dustrial arts and vocational areas. In the infancy stage of this program, the administration realized that duplication in facilities was a waste of taxpayers' funds. Through the effective use of a structural program for the individual, a facility could be used to meet multiple objectives. The industrial arts function in this facility would be exploratory and pre-technical in nature, followed by a more in-depth study in specific trades that would lead to possible employment. The industrial arts program is divided into four major concept areas as indicated in Figure 4: manufacturing, construction, communication, and power and transportation. Following these broad general categories in Figure 4 are pretechnical courses in unit-type subjects such as: electronics, graphics, power mechanies, and building trades, etc. The next level after the industrial arts pre-technical courses

Figure 6


VOCATIONAL PHOTOGRAPHY
PRE-TECHNICAL PHOTOGRAPHY
STILL PHOTOGRAPHY
STILL PHOTOGRAPHY
CINEMATOGRAPHY
COMMUNICATION USING LIGHT SENSITIVE MATERIALS
COMMUNICATIONS
COMMUNICATION BY WIRE
WIRELESS COMMUNICATION
CONSUMER ELECTRONICS
PRE-TECHNICAL ELECTRONICS
VOCATIONAL ELECTRONICS
INDIVIDUAL GRAPHIC COMMUNICATIONS
MASS GRAPHIC COMMUNICATIONS
SCREEN PROCESS PRINTING
COMMUNICATION USING PRINTED MATERIALS
PRE-TECHNICAL GRAPHIC ARTS
VOCATIONAL GRAPHIC ARTS
MECHANICAL DRAWING
PICTORIAL DRAWING
ARCHITECTURAL DRAFTING
COMMUNICATION USING DRAWINGS
PRE-TECHNICAL DRAFTING
VOCATIONAL DRAFTING
A
B
C

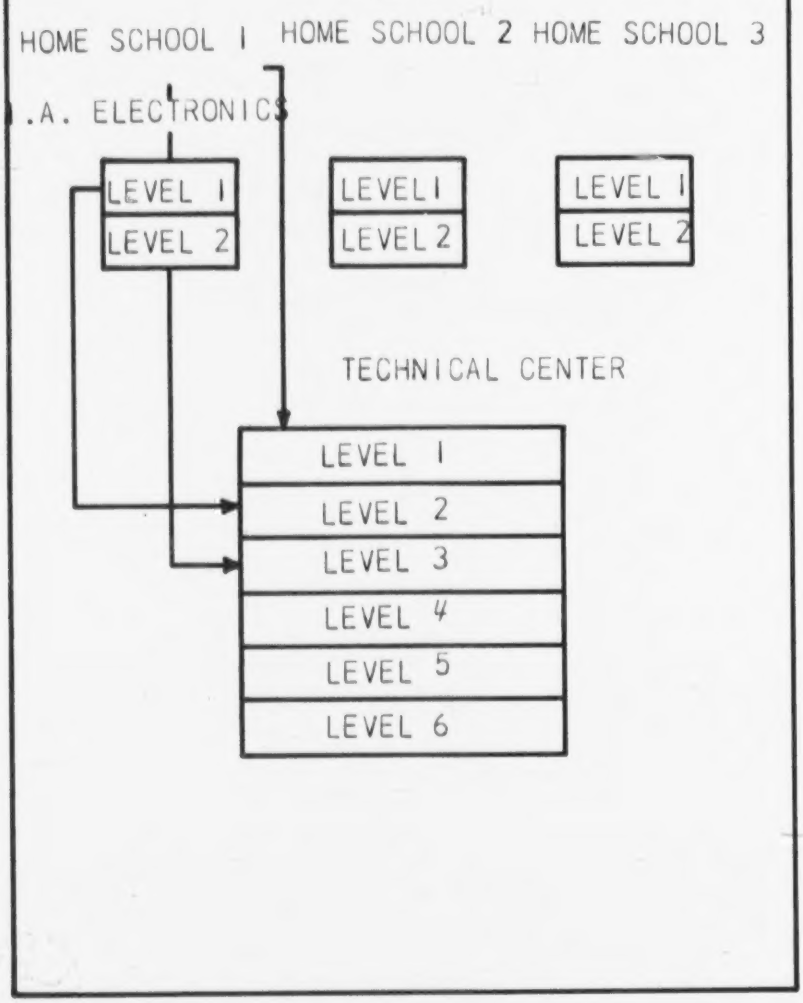
are vocational subjects taught in the areas of auto mechanics, masonry, electronics, printing, and drafting. This type of program provides the student with a broad base from which to start and slowly narrows him into a specific area of the original base concept. Using Prince William's communications facility as an example, the following format on Figure 3 is noted. The communications pod consists of an electronics, graphic arts, and drafting lab, all located in one area of the building. See Figure 2. Seventy-five students are scheduled for communications, in which the entire three labs are used as one communications facility.

The team-teaching approach provides the program with needed expertise in all of the communications areas. As students rotate through the various activities in each area, experiences are based on a conceptual framework such as mass communications, individual communications, telecommunications, communications using light-sensitive materials, etc. "Hands-on" experiences in these three basic areas provide the student an opportunity of choosing one of the three pre-technical one-hour courses. The industrial arts function in this program is limited to the communications and a one-hour pre-technical program. The program does not offer a second one-hour option, but channels students into a multiple-block vocational program in all three areas. The eliminating of the sequential one-hour courses reduces the conflict between the industrial arts and vocational objectives. Figure 5 shows a typical six-period day and how the lab would be scheduled for both industrial arts and vocational activities. Figure 6 shows a communications program schedule.

Maximum capacity of the facility is 75 students at any given time. The possible student combinations could vary, depending upon student demands. The entire communications area must be scheduled for communications, but various combinations of pre-technical and vocational courses can be run simultaneously. Although we are only in our second year of operation, we believe that this program will be fairly successful.

One of our major problem areas is certification of instructors in both the vocational

Figure 7


HOME SCHOOL 1
HOME SCHOOL 2
HOME SCHOOL 3
.A. ELECTRONICS
LEVEL 1
LEVEL 2
LEVEL 1
LEVEL 2
LEVEL 1
LEVEL 2
TECHNICAL CENTER
LEVEL 1
LEVEL 2
LEVEL 3
LEVEL 4
LEVEL 5
LEVEL 6

and industrial arts professions. Both areas in the State Department must show some leniency in their requirements to provide us with the opportunity of carrying out this experimental program.

The central technical center approach could also work within the realms of this same pattern by establishing a sequential program with a multitude of levels. Students could move from local schools to the central technical center, enrolling in a level of accomplishments which recognizes previous skills attained at their base school. An example of this format should be one in which the following ten concepts were taught in electronics: (1) tools and equipment; (2) measurement; (3) components; (4) circuits; (5) systems;

(6) maintenance and repair; (7) occupational information; (8) consumer knowledge; (9) language; and (10) safety. See Figure 7. These concepts would be basic to all levels of electronics from communications through vocational. Each level would have a specific objective and student activities in all of the ten concept areas. If three levels of the program in electronics are provided at the base high school, a student could have the option of taking the first three levels in his high school and transfer to the technical center starting at program level four and continuing on until he reached his maximum training capabilities. The same ten initial concepts would be taught at the vocational school, but a different emphasis would be placed upon each. By using this multiple level approach, various schools could feed the central technical school with students of different aptitudes and abilities. The central technical school could be assured of the content and experiences that the student had received before entering their program.

There are many other possibilities for cooperation between industrial arts and vocational education. The time has come for the creative and initiative men of our profession to provide us with leadership in accomplishing this major task. Let us forget the industrial arts of the past and its roles and look to the future needs of children and the society they will serve.

Mr. Bonfadini is an industrial arts supervisor, Prince William County, Virginia.

Public Relations Role of Industrial Arts

James E. Good

Public relations must be a well-planned, systematic, two-way process of communications resulting in a working partnership between staff and community that will encourage enthusiastic support of the total educational program, including industrial arts.

Whether we care to admit it or not, the public is holding the schools accountable for providing quality educational programs at the lowest possible cost. Rising costs in education, unrest among special interest groups, and student apathy have combined to generate a new interest in the school system. The public is asking more questions and demanding answers to account for these increased costs and apparently unsolved problems. Emerging distrust between parents, citizens, and educators indicates a lack of successful communications.

Industrial arts educators must be conscious of the need to provide answers and contribute to the development and implementation of a public relations process which will ensure public support and confidence not only in industrial arts programs, but in the entire educational program. Failure to do this could be detrimental to continued program development or the maintenance of existing programs, not to mention the possibility that programs could be eliminated entirely.

There must be a clear-cut, systematic, sequential plan for industrial arts compatible with school and community philosophies and relevant in terms of individual student needs, desires, interests, capabilities, societal and career pursuits. It must be a comprehensive program providing for smooth transition vertically and horizontally, allowing an individual to progress through the various stages of decision-making, problem-solving and exploration of likes and dislikes in areas commonly associated with contemporary industrial and technological society. The plan for industrial arts education must also be compatible with the over-all goals and objectives and other subject areas. Within each phase it must contain content, activities, and resources which not only reflect current and future economic and societal trends presented in a multi-sensory environment compatible with individual learning styles.

In short, there must be a quality product before beginning a public relations campaign. It is important not to overlook the fact that existing resources may be limited, and a successful public relations program may be essential before all goals can be achieved. This concept has been overworked to excuse negligence in planning and organizing a procedure for communicating with the public. A clear plan for communications is like the ticket Dwight Morrow, distinguished ambassador to Mexico, was unable to find while traveling on a train. He was embarrassed, but the conductor recognized him and, observing his anxiety, reassured him by saying, "Don't worry, Mr. Morrow; I'm certain that you have your ticket. When you find it, mail it to the company." "Worry be hanged," exploded Morrow, "if I don't find the ticket, I won't know where I'm going." If nothing else, an organizational plan will indicate present status of program and the direction in which to proceed. Such a plan, representing the best thinking of the educators involved, should serve as a basis for joint refinement with the assistance of community advisory committees.

Inherent in the plan is the first test of what might be referred to as internal public relations. Such an organizational plan is useless unless it demonstrates a harmonious, well-tuned atmosphere between colleagues within industrial arrs as well as the entire faculty within each phase and at each level of the program. This means the plan has to be developed internally, agreed upon by all staff, and accepted as individual responsibility within identified roles in the total program. There is no room for dissention in the ranks. That means the relationships between industrial arts, elementary, junior high, and senior high, vocational education and adult and higher education must be understood and accepted by all personnel. Within each phase, industrial arts educators must know and respect the role of other staff members and contribute whenever possible to the achievement of the over-all educational goals and objectives.

A good total public image is essential. However, it cannot be superficial or contrived for the benefit of the public. The program must be good and the unity sincere before presenting the image because there is no way to "fake it." A phony publicity campaign can do much more harm than good at a time when educational credibility is openly questioned.

When there is a consistent and comprehensive plan for the industrial arts program and internal harmony among staff members, attention can be turned toward gaining support for program from building and district administration, including the Board of Education. Hopefully, the administration has been kept informed, if not actively involved, in the efforts to create program and attitudes to this point and are aware of the progress being made. This can be accomplished by such things as:

1. Holding an open house for the purpose of explaining the total program, including immediate and long-range plans and identifying those items for which the department should be held accountable.

2. Developing and distributing brochures and audiovisual aids which outline program and opportunities for students at each level.

3. Requesting the opportunity to present the program to the school board and involving staff members at each level in the presentation.

4. Building into the process a means of providing for the administration, including the school board, copies of all published materials written by staff members or publicity about program and personnel or events which pertain to the program that might be of interest to them. Examples of production items and reports where possible should be included.

5. Identifying activities which may be integrated into broader school or community projects which would accomplish identified objectives as well as providing a service that would benefit the entire school or district or community. There are many such examples in every school district within the scope of the areas of manufacturing, communications,

transportation, and construction.

6. Being conscious of the goals and objectives of the administration and attempting to initiate or follow through on ideas which have merit.

Think in terms of total staff involvement and establish a process whereby all staff members feel comfortable with the system and desire to contribute to it. More important, all due credit should be given for any and all participation by individuals. Any attempt on the part of department heads, supervisors, or other administrators to "steal the thunder" from any staff member who contributes is detrimental to the entire process and should be avoided at all costs.

Now that a good department, building, and district relationship has been established, attention can be turned to the community because the program deserves community support. Public relations with the community cannot be thought of as something to be turned to only in cases of emergency or times of crisis like the old salt-crusted sailor who had just weathered a severe storm and reported to the Navy chaplain, "I sure did pray during that blow. I'm not a praying man, but I prayed hard that time."

"What did you say in your prayer?" asked the chaplain.

"Oh," replied the sailor, "I said, 'Lord, you know that I have not asked you for anything for fifteen years, and if you'll get me out of this storm alive, I won't bother you again for another fifteen years!'" Public relations must be a continuous process to enlighten and inform the public and encourage constructive community involvement. The lines of communication should be kept open.

Since good public relations begins with listening, the first step is to develop a process for listening and attempting to discover how the public really feels about the educational program and where it is willing to assist in developing and supporting it. Perhaps the most effective way is to establish an advisory committee to assist in refining, implementing, and evaluating the program in terms of local and regional needs. This committee should be a representative cross section of business and community leaders representing all subject areas taught or projected in the industrial arts program. Individual members should be encouraged to seek their own identity within the total program and feel comfortable in contributing to the refinement of that particular aspect of the program. While this committee cannot be a policy-making group, its recommendations and advice should be given careful consideration and followed to the greatest possible extent. All committee members and activities should be well publicized in the local media.

A school-community partnership for continued program development, implementation and evaluation has been established with the creation of the advisory committee. At this point it is of paramount importance that the process expand into all segments of the community and educational system for the purpose of communicating. This expansion includes vocational advisory councils, and committees, regional planning groups, professional groups such as the American Society of Metals (A.S.M.), the Society of Plastics Engineers (S.P.E.), and adult and continuing education planning groups.

Ensuring proper coverage requires a great deal of team work and planning. The advisory committee, in cooperation with staff, should identify all such groups and determine who should be assigned the expectations and the extent of involvement at each stage. Wherever possible, all activities should be well documented and released to school administration and community media.

Equally as important is the management process utilized to handle the input, evaluate it, and incorporate it into a working plan which carefully outlines all priorities, tasks associated with each, individual and group responsibilities, timetable, and evaluations. If this process is not established and implemented with all members knowing their exact responsibilities and following through on them, the lines of communications can break down and inhibit good public relations. However, with a successful management process, the program will continue to gain public as well as internal support and will remain current with community expectations and needs while serving individual student needs and aspirations more satisfactorily.

Mr. Good is District Supervisor for the Greece Central School District, Rochester, New York.

Implication for Action

James E. Good

My role is to highlight some possible effects and changes in industrial arts implied in the second draft of the guidelines for industrial arts in career education. Please remember these guidelines are still in draft form and will not be finalized until all input is received at this convention and the committee has had an opportunity to incorporate your ideas and recommendations. Consequently, if I imply or say something in this presentation that concerns you, or in your opinion needs elaboration or modification, please submit your comments to a member of the committee as soon as possible.

The committee has learned a lot during the past two years about what career education is and what it is not. Rather than play a word game and write our own definition of career education, the committee elected to stay with the original definition written by Dr. Sidney P. Marland which appeared in our report on "Criteria and Guidelines for Funding Industrial arts."

> Career education is the development of a lifelong learning process that provides for a broad approach to preparation for citizenship; provides job information and skill development; and also helps individuals develop attitudes about the personal, psychological, social, and economic significance of work in our society. It develops and fosters vocational and recreational interests of individuals to help prepare for well-rounded living in a world in which leisure time is increasing and greater opportunity for self-expression through creative production is available.

In essence, this definition implies three broad goals for career education: learning to live, learning to learn, and learning to make a living. By integrating these goals into a lifelong educational process, it should be possible to unify all aspects of education for the prime purpose of assisting every individual to become a fully capacitated, self-motivated, self-fulfilled, contributing member of society. As such, career education is equally concerned with all aspects of an individual's lifestyle, and opportunities must be available for each citizen to participate in activities and experiences which will contribute to his role in

a. the economic life of society by being a producer of goods or renderer of services;
b. fulfilling his obligation as a member of a family group;
c. participating in community activities;
d. avocational activities;
e. accepting responsibility in the aesthetic, religious, and moral life of the community.

Industrial arts and vocational education have a major role to play in career education, but it must be put into perspective and viewed as only a part of the total process.

In analyzing the general and specific characteristics implied in the guidelines which reflect program change, I have extracted those which I feel deserve the greatest attention. These include increasing the relevancy of school subjects, scope and sequence, guidance and counseling, occupational and career information, activities, flexibility, cooperative work study program, youth groups, advisory committee, and evaluation. Time will not permit me to explore each in depth, but I would like to outline briefly the implications of each. These are all interdisciplinary characteristics. Industrial arts educators must view themselves as contributing team members toward the fulfillment of each and not attempt to monopolize any aspect.

BASIC SKILLS

It is imperative that the basic skills, such as reading, writing, speaking, listening, and computation essential for all, regardless of career goal or lifestyle, not be neglected. However, the first task of all educators is to get these skills defined in specific measurable terms so we all know what we are talking about. The second task is to take advantage of technology and implement an assessment and reporting process which will enable us to know exactly how each individual is progressing in relation to the specific skills.

The greatest contribution of industrial arts will most likely be to assist in restructuring and focusing the curriculum and subject matter around activities and themes which are appropriate to the cultural, social, and economic functions of society. If this content is not presented in meaningful, coherent, motivational, and humanistic terms, we will never get a handle on the high dropout rates, absenteeism, vandalism, and low achievement scores.

The committee has been somewhat hesitant about using the term 'cluster' because of its susceptibility to misinterpretation. However, we do support the intent of the 15 United States Office of Education career clusters and recognize that they reflect a means of classifying common economic and societal pursuits which make up our American way of life. They must not be overlooked, and industrial arts must find its identity within and address themselves accordingly. Specifically, this implies that the traditional wood, metal, and drafting facilities and programs will have to reflect broader goals related to such areas as transportation, construction, communications, manufacturing, and personal services throughout its entire spectrum.

SCOPE AND SEQUENCE

Building on the career development and decision-making process, industrial arts is integrated throughout the entire educational structure—K-life. Within the realm of our industrial-technical enterprise, it has an important role to play in each of the five levels or phases of awareness, orientation, exploration/pre-specialization, specialization, and adult and continuing education.

The over-all organization and activities within each phase must be consistent with the goals of career education for all subjects, including industrial arts. In addition, the phases imply a systematic and sequential management system compatible with the decision-making process.

There is no clear-cut barrier which separates general from academic education, or industrial arts from vocational education. Interdisciplinary and team planning within each phase and between phases is essential. Specifically, this implies the need for a clear-cut state, regional, and local organizational and management plan which extends from the awareness to the adult and continuing education level. It must be aligned with the goals of career education and the purposes of industrial arts, be realistic, attainable, developed in detail, and have a built-in process for on-going assessment and evaluation.

MULTI-ACTIVITY APPROACH

Industrial arts has always taken pride in its multi-activity individualized approach to learning. The guidelines imply from the definition of industrial arts to evaluation that the program must revolve around activities related to experimenting, planning, designing, constructing, evaluating, using tools, machines, and processes throughout each phase. This means the use of a variety of teaching methods and media, flexibility to accommodate individual learning styles, and educational opportunities beyond the school.

FLEXIBILITY

One of the goals of career education is to provide flexible options for all persons to enter or re-enter the world of work or the educational system. It also encourages flexibility within each phase to allow for a multi-sensory environment consistent with individual needs, desires, capabilities, and interests. Applying this goal specifically to industrial arts, we should see

a. courses consistent with economic and societal pursuits which vary in length from one to 40 weeks, with virtually unlimited entry—re-entry capabilities;

b. provisions for spin-in—spin-out external activities which provide field observations and hands-on experiences in industrial-technical pursuits commonly associated with the community and region;

c. a definite process for the utilization of community human and physical resources as an integral part of each phase;

d. multiple sequences which provide for breadth and in-depth experiences at the exploratory, pre-specialization, and specialization level consistent with individual needs, desires, and interests.

e. complete flexibility at the specialization level to spin-in-and-out of adult, vocational, higher education, and cooperative education courses. This flexibility should be open to all citizens in the community.

f. ample activity options should be provided to accommodate individual learning styles.

OCCUPATIONAL AND CAREER INFORMATION

One of the biggest additions to industrial arts as a result of the committee activities was the inclusion of the goal related to student understanding of career opportunities and requirements. The goal reads as follows:

> Develop an understanding of career opportunities and requirements available in industry and develop those traits which will help students obtain and maintain employment.

This goal adds another dimension to the role of industrial arts. Working in the realm of the industrial technologies and evolving the content and activities around broad cluster fields, career information must be integrated into the program in each phase. This information should include social implications, nature of the work, working conditions, entry-level qualifications, required preparation, advancement opportunities, remuneration, and ways to enter industrial-technical fields of their choice. This includes staying within the scope of each phase, decision-making, and making maximum use of external and internal resources.

At the awareness level, activities within each cluster should focus on such things as what the occupations look, sound, and smell like, who works in these occupations, what is the lifestyle of the people, and where are the jobs. At the orientation level, there is more refinement of likes and dislikes. Consequently, emphasis should be placed on specific tasks, working conditions, physical and intellectual requirements. Field observation and explorer programs should be common at this level, in addition to class simulation, role playing, and research. At the exploration and pre-specialization level, the process is more refined because the student is rapidly reaching the stage where he will make a decision to pursue a specific career in greater depth or continue with a breadth approach. At this stage, such factors as job obsolescence, job hazards, advancement opportunities, personal requirements, remunerations, fringe benefits, entry requirements, and application procedures become more critical. Students at this level should be actively involved in field experiences, community service projects, and exposed to pertinent career information utilizing resource people which will assist in their decision-making process.

COOPERATIVE EDUCATION

At the specialization level, in addition to developing specific job entry skills in vocationally-oriented courses, the student will most likely be enrolled in a cooperative work study program which provides the student with a realistic work environment under supervision. This program has proved invaluable in assisting the students in making the adjustment from school to the world of work, not only in the application of acquired skills but in improving student attitudes and understanding towards work and school. While such programs have traditionally been associated with vocational education, there is a broader dimension and subsequent role for industrial arts which should encompass each phase as a key example of articulation. For example:

a. At the K-6 awareness level, it can be the vehicle for identifying and utilizing community resource people.

b. At the 7-8 or 7-9 orientation level, it can be the key for the infusion of community and industrial observations into the program.

c. At the 9-10 exploration and pre-specialization level, it can assist in providing continual observation experiences and coordination of community service projects.

d. At the specialization level, in addition to the opportunities for supervised work experience for the vocational student, it can provide initial employment opportunities for students who are not enrolled in vocational specialization courses but desire employment opportunities which will assist in assuring more successful future employment.

e. Placement opportunities would be tied in at the adult and continuing education level.

GUIDANCE AND COUNSELING

One of the most important threads infused throughout the guidelines and, hopefully, implied in this presentation, is our role in guidance and counseling. The guidelines infer that guidance must be an integral part of the total program and the responsibility of all staff. The activities within each phase of industrial arts must be concerned with developing student attitudes, self-awareness, and self-direction and expanding student awareness, aspirations, and decision-making abilities related to personal growth and career development.

Formal and cooperative relationships between counselors and industrial arts educators are essential in accomplishing this task. Specifically, counselors should be built into all program development and implementation plans and viewed as regular staff members. Mutual goals must be understood, and cooperative efforts should be undertaken in utilizing community resources, obtaining and integrating meaningful data into the curriculum, in-service training, conducting student conferences, preparing student schedules, and discussing problems. In short, such cooperative efforts are essential in individual assessment and advisement during the various and complex stages of career decision making.

YOUTH GROUPS

The success of such student organizations as VICA, FFA, FHA, FBLA, and DECCA could not be overlooked in our planning. As a result, the guidelines recommend the formation of an industrial arts club and integration of related activities into the regular school program.

In planning curriculum, it would seem advisable to integrate many of the activities related to group production, community service projects, field observations, and community resource bank into club functions.

ADVISORY COUNCIL

It would be impossible to develop, implement, and evaluate a program of this magnitude without the assistance of an advisory committee. The committee should be staffed with people who represent each of the major components of the program. Specific tasks of the committee should be to assist in

a. determining course offerings and sequences;
b. identifying and developing content, activities, resources, and facilities;
c. identifying and utilizing community resources;
d. program evaluation.

While this committee would focus primarily on the development and implementation of an industrial arts program or a career cluster which depends a great deal on industrial arts personnel, it would be expected that representatives of this committee would serve on general advisory committees responsible for all aspects of education, including vocational education, adult education, regional and state-wide planning. While the committee should not be viewed as a policy or decision-making group, their advice, input, and recommendations should be given close attention.

EVALUATION

Evaluation must be viewed as a positive and essential aspect of the program. The guidelines contain a rather extensive section on internal and external evaluation which the committee feels should be closely followed in determining whether the program is accomplishing its intent and which areas deserve and need priority attention. The evaluation process must be conducted on a regular basis in an objective way, utilizing the services of staff, administration, students, community members, and advisory committee members. Once problem areas or weaknesses are identified, they must be dealt with in an effective and efficient manner.

CONCLUSION

These guidelines are being developed with a great deal of assistance and input from the profession. Many program changes are implied and no doubt some will not materialize.

However, the role of industrial arts is vital in the career education thrust, and industrial arts educators have an obligation to fulfill this commitment and should be willing to be held accountable accordingly.

Mr. Good is District Supervisor for the Greece Central School District, Rochester, New York.

Upgrading an Established Traditional Industrial Arts Program

Jerry D. Hardy

In order to acquaint you with the industrial arts program in Roanoke County, I should first like to give you a biographical sketch of the county school system. This will lay the groundwork for the first phase of my presentation.

The Roanoke County School System is composed of 40 schools with a total school population of 24,000 pupils, making it the largest school system in Southwest Virginia. There are 28 elementary schools, five junior high and intermediate schools, five high schools, one vocational, and one special occupational school.

Aside from the traditional programs found in most schools, Roanoke County provides a variety of additional programs designed to meet the needs of all children. There are a number of schools which engage in team teaching, some organized on a non-graded plan, while other programs are developed in open-space facilities and staffed by teams of eight teachers to five-room suites. Reading programs, science programs, art and music programs, and physical education programs are all a regular part of the elementary organization. Elementary grades are normally kindergarten through grade 5.

Our junior high and intermediate schools are generally composed of grades 6, 7, and 8. This organizational pattern is changing to grades 7, 8, and 9 as enrollment increases at the high school level. These schools are organized on a combination of the block concept and the flexibility of the modular approach. In addition to the basic subjects of English, mathematics, science, and social studies offered in our junior high and intermediate schools, we also offer industrial arts, home economics, music, health and physical education, foreign language, typing, drama, and band.

Our secondary schools are generally composed of grades 9 - 12, with subject offerings ranging from 80 to over 120 subjects. The majority of our high schools are organized on the modular program concept. The schedule is based on a 6-day cycle rather than the traditional 5-day week and has increased our course offerings by more than 30%.

INDUSTRIAL ARTS PROGRAM (PAST AND PRESENT)

In the past, without proper coordination, the industrial arts programs in the Roanoke County School System have been helter-skelter. The curriculum to a large extent was based on what type of equipment was available to individual schools and what individual industrial arts teachers wanted to teach. Our local supervisor was at that time the director of instruction, who also had direct responsibilities for the art teachers, librarians, and foreign language teachers, as well as coordinating the various other areas.

When I first started teaching in Roanoke County at Glenvar High School, there were a total of 6 industrial arts teachers situated in 5 local high schools. We had a total county industrial arts enrollment of 750 youngsters. We were faced with comments from the high administration level like, and I quote, "Most of our industrial arts programs are nothing but hobby shops," and I think the reason for this was that the Roanoke County industrial arts programs for the past 15 or 20 years had been digesting only a pork and bean diet. By this I mean that there were only two courses being offered in the industrial arts curriculum—woodworking and drawing.

Since 1968, when we first began our comprehensive in-service program, the complexion of our program has changed—and hopefully for the better. We have a total of 21 industrial arts teachers situated in 5 high schools and 5 junior and intermediate schools, and our present enrollment is approximately 2,600 students.

Our junior high program is built upon the premise of exploratory technology. The more input these youngsters have at this level about their technical environment, the better they are able to make a career decision—especially those youngsters who are going to be faced with the world of work when they finish school.

In the sixth and seventh grades, our students are exposed to the world of technology and industry by utilizing the unit and group method of instruction. These courses are offered to all sixth and seventh grade students on a 6-week rotating basis. The courses involve learning centered on a common theme such as transportation, communication, power and energy, and tools and machines. A student constructs a model, using hand tools, representing his area of investigation. In addition to this, the student makes a display and shares his progress, problems, and other findings through the seminar process.

The eighth and ninth grade programs at the junior high and intermediate level are composed of two 36-week electives involving the I.A.C.P. concept of The World of Construction and The World of Manufacturing. The junior high and intermediate school student has the option of studying either construction or manufacturing in either the eighth or ninth grade. At present, we feel these programs best represent the philosophy of our program at this level. One of the priorities we have with our program is trying to help youngsters explore the world of work in order to help them make accurate career decisions. We do not feel this is accomplished by having students work with things only. These youngsters need to be exposed to people and data and their interactions with things.

At the secondary level in our industrial arts programs, we are experimenting with mini-courses which are operated under a modular-flexible schedule. The features of our secondary industrial arts programs in Roanoke County are as follows:

1. Varied class length: 17-minute modules, from 2 to 6 modules (34 to 102 minutes)
2. Variable class frequency: 1 to 6 meetings per week
3. Varied class size: 6 to 160 students
4. Team teaching
5. Schedule cycle: one full scheduling cycle occurs each 6 school days
6. No study halls: unscheduled time (called Gain Time, an acronym for Going Ahead Independently) can be spent in a variety of locations and activities

In a high school with traditional scheduling, we were only able to offer 3 courses to approximately 200 students using two industrial arts teachers. Using flexible modular scheduling, we have now been able to overcome our lab space shortage and, under similar circumstances, we are able to offer 8 courses to approximately 350 students.

Our philosophy with our secondary industrial arts program is to be pre-technical oriented. We also feel that our expertise should be utilized in offering any technical subject youngsters would be interested in. Our assumption is that youngsters enrolling in our industrial arts programs at this level are there because they have a personal need. Many will graduate and enter two and four-year institutions of higher learning. The following courses are presently being offered in Roanoke County at the secondary level:

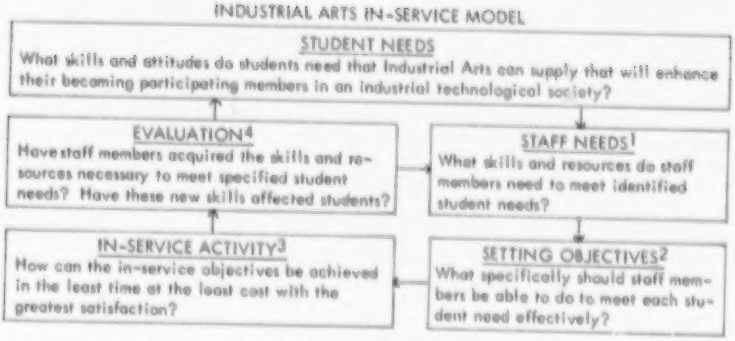
1. Manufacturing Technology
2. Communications Technology
3. Construction Technology
4. Power and Transportation
5. Industrial Crafts
6. Practical Home Mechanics
7. Technical Drawing 1
8. Technical Drawing 2
9. Architectural Drawing

IN-SERVICE

In order to accomplish what we in Roanoke County have attempted to accomplish with our industrial arts program during the past five years, a competent in-service program had to be developed.

Our county, through the foresight of our Assistant Superintendent for Instruction, came up with a systems model for in-service planning for our industrial arts program. Essentially, this model has four components which revolve around the needs of the students as being foremost. Once the students' needs are identified, we determine what skills and resources our staff must possess in order to meet the identified student needs. Further refinement is necessary in order to set the objectives of what staff members specifically should be able to do to meet each student's needs effectively. Next we determine how our in-service objectives can be achieved in the least time at the least cost with the greatest satisfaction. Finally, we ask ourselves the questions: 1) "Have staff members acquired the skills and resources necessary to meet specified student needs?" 2) "Have these new skills affected students?" If we determine through evaluation that the needs of the students are not being met, we then recycle and determine through evaluation what areas are weak and need additional work.

INDUSTRIAL ARTS IN-SERVICE MODEL



STUDENT NEEDS
What skills and attitudes do students need that Industrial Arts can supply that will enhance their becoming participating members in an industrial technological society?

STAFF NEEDS[1]
What skills and resources do staff members need to meet identified student needs?

SETTING OBJECTIVES[2]
What specifically should staff members be able to do to meet each student need effectively?

IN-SERVICE ACTIVITY[3]
How can the in-service objectives be achieved in the least time at the least cost with the greatest satisfaction?

EVALUATION[4]
Have staff members acquired the skills and resources necessary to meet specified student needs? Have these new skills affected students?

With the concept of this model in mind, we began to explore a needs assessment for students enrolled in our industrial arts programs. What basic skills and attitudes could industrial arts furnish to these students that would meet their needs?

It was very apparent at that point that our staff lacked the skills and resources necessary to meet the identified needs of our students. We feel that our industrial arts program at the junior and senior high level should reflect more opportunities for youngsters to explore their technological environment than by just giving the opportunity to make projects in wood, metal, and ceramics. The options we had for in-service activities stemmed primarily from resource people from the northern part of our state. Our industrial arts state supervisor was brought in for recommendations as to which in-service activities would best fit our objectives.

We were then able to bring in some of the finest resource people available in the state. We flew in instructors from Prince William and Fairfax Counties to involve our industrial arts instructors with some of the new curriculum patterns which were being successfully implemented in northern Virginia. Through the tremendous cooperation of Virginia State College at Petersburg, we were able to offer our industrial arts instructors graduate credit using the consultants from Prince William and Fairfax Counties as adjunct professors for Virginia State.

In the past one and one-half years, we have offered to our industrial arts staff the workshop courses in I.A.C.P. construction and manufacturing. At the present, we are again offering the World of Construction workshop program to our industrial arts staff who have not had the opportunity to take it.

In the future for Roanoke County industrial arts programs, we look forward to expanding our programs at both the junior and senior high school levels. We would like to offer more of the career education clusters such as Transportation and Communication at the junior high level. We see the high schools moving more toward the area of technology specialization. Mini-courses which represent student appeal will dart in and out of the flexible curriculum as we continue to try to meet the needs of our students.

Mr. Jerry D. Hardy is a Supervisor of Industrial Arts for the Roanoke County School System, Salem, Va.

Maintaining an Industrial Arts Program in a Large Suburban School System

George Litman, Jr.

I plan to address my thoughts this afternoon to the curriculum specialist's role in "Maintaining an Industrial Arts Program in a Large Suburban School System." Eight years ago, I became a curriculum specialist in industrial arts education in a rapidly growing school system with new schools being planned and several under construction. It was at that time that I determined to establish an industrial arts program based upon the goals of education. Also, I knew that with all of our new facilities, with air-conditioned laboratories being built and with new equipment being purchased, these advantages alone would not change the program to reflect the new trends in industrial arts education.

In 1965, Fairfax County Public Schools had a student population of 89,000. Today our enrollment is over 136,000, with the school system being the 15th largest in the nation. Enrolled in the general industrial arts program are 15,000 students taught by 139 industrial arts teachers. With the number of schools and industrial arts teachers increasing each year, it was difficult to supervise and visit each teacher in our schools on a schedule. There are presently 20 secondary, 20 intermediate, and 5 elementary schools with industrial arts programs.

After assessment of the existing industrial arts program, it was evident that the program in each school was what each industrial arts teacher wanted it to be, with little continuity from school to school and very little change from course to course. The curriculum was what it had been for years, and it had become obsolete in terms of the youths' environment and today's industrial technologies. I knew that we needed to establish a four-step approach with its purposes being: (1) to determine a definition for the industrial arts program on the basis of the educational goals set forth for the Fairfax County Public Schools; (2) to select equipment on the basis of the definition of the industrial arts program and commitment to its goals; (3) to provide in-service activities for industrial arts personnel to develop competencies in methodologies and new technologies to be taught; (4) and to observe change of teacher behavior and evaluate implementation of desired program and outcome.

After the involvement of consultants from teacher training institutions and industrial arts associations, state department personnel, and several of our industrial arts teachers, a program was decided upon and a definition was set forth.

The "new industrial arts program" was designed to prepare our youth for more effective living in an industrial technological society. Industrial arts was to be considered a part of general education. We did and do today derive our content from technology—its evolution, utilization, and significance, and the problems and benefits resulting from the technological and industrial nature of society. The industrial arts laboratory then was to present an area of learning found in no other place in the school.

In the existing schools, we began to make renovations to accommodate the kinds of facilities needed to provide a setting conducive to achieving our objectives. Many hours were spent at the drawing board and in consultation with architects and engineers, determining what walls could be moved and what power sources were available. We established a standard ~~for and~~ decided on the quantity of general and unit laboratory facilities needed to serve a secondary school population of 2,000 and an intermediate enrollment of 1,200. We were then able to increase or decrease the number of laboratories on the basis of the size of the school to be constructed. In the facility we provided for storage and instruction and laboratory activities.

After the facilities were standardized, an equipment table of allowances was prepared which allowed for budgeting and provided continuity of equipment among schools. The equipment list was used to develop equipment specifications, which included the size of equipment, safety requirements, service manual and a statement on in-service for teachers. All equipment requiring electrical power was connected with a twist lock plug, to provide versatility.

Once a pattern of facilities and equipment was established, most of my efforts were and will continue to be in the area of in-service and evaluation. Being the only curriculum specialist in the school system to provide the leadership for industrial arts, I have decided to concentrate on in-service. Over 50% of my time is spent in this area—organizing, arranging, directing, seeking, administering, initiating, visiting, corresponding, and coordinating with many different organizations. I have titled this portion of my activities of in-service "a cooperative model for industrial arts education."

Plans are under way to provide in-service for this summer's courses and August workshops for our teachers. For August workshops, letters have been sent to manufacturers and to distributors of equipment; contacts have been made and discussions have been held with our vocational teachers.

We have provided our industrial arts teachers with an additional week's contract to make them available for an August in-service workshop. They must be compensated by pay or college credit, or both whenever possible. This school year, 72% of our industrial arts staff are enrolled or have been enrolled in college courses involving them in curriculum development, technologies, and/or methodologies.

The following depicts the changes in methodologies and industrial technology in our program from 1965 to 1973.

Industrial Technology Areas

1965

Mechanical Drawing
Metalworking
Woodworking

1972-73

Mechanical Drawing
Ceramics
Electricity
Plastics
Graphic Arts

Power Mechanics
Pneumatic Power
Electroplating
Material Testing
Woodworking

Metalworking
Electronics
Surveying
Fluid Power
World of Construction
World of Manufacturing

Methodologies

1965

Individualized Projects
Limited Line Production

1972-73

Individualized Study
Anthropological Unit
Instructional TV

Programed Instruction
Group Project
Line Production

Technological Development
Research and Experimentation
Contemporary Unit

Unfortunately, instructors teach what they were taught in college or the content which they acquired through in-service in conferences, short- or long-term courses, and interest-group sessions conducted by colleges and/or universities, local or state supervisor and directors, and industrial or business agencies.

Public school educators must continue to strive for cooperation with manufacturers, distributors, colleges and/or universities, and technical education foundations to provide the expertise in the technical areas for in-service workshops for industrial arts teachers.

As career education becomes more emphasized, industrial arts teachers will need to retool through courses in which theory-demonstration and hands-on activities provide a complete understanding of the "what" to teach. As new industrial technology is developed, in-service for industrial arts teachers, supervisors, and administrators will need to continue in order to develop their competencies and establish their new role in industrial arts and career education.

The role of a curriculum specialist in a large school system becomes one of providing leadership and directing the industrial arts program in alliance with national trends in industrial arts education and the goals of education. He must provide the expertise in industrial arts necessary for directing curriculum projects and in-service and course workshops, consulting with schools and community, dealing with public relations, and serving on local, state, and national committees on industrial arts education. The industrial arts curriculum specialist must be willing to continue "up-dating himself" as well as providing in-service to enable his staff to change with environment in a changing industrial technological society.

Mr. George Litman, Jr., is Curriculum Specialist for Industrial Arts with Fairfax County Public Schools, Fairfax, Virginia.

ACIATE

Instructional Guidelines for Teaching Technical Concepts

Everett N. Israel

The testing of three different instructional guidelines identified that the "How-to-do-it" approach did not result in senior high school students acquiring an abstract understanding of a technical concept. Abstract learning did occur when the instructional procedure involved the use of a subordinate hierarchy to organize knowledge, the nonverbal media to illustrate attributes of a technical concept, and the verbal media to explain why the nonverbal phenomena occurred and interrelationships between attributes.[18] This finding was based upon funded research conducted by the author in a large county school system.

An instructional guideline was defined as the strategy used by a teacher to determine what knowledge is to be presented to students, how it is organized, and how it is to be presented. The different instructional guidelines were tested to determine the type of instructional strategy that would result in junior and senior high school students acquiring the largest amount of abstract learning related to a technical concept.

The instructional guidelines tested, according to their predicted outcomes, were that the use of a subordinate hierarchy and the verbal instructional medium complementing the nonverbal instructional medium (instructional guideline number) would result in students developing a higher level of abstract understanding of a pre-selected technical concept than the use of the subordinate hierarchy and the verbal instructional medium alone (instructional guideline number 2) or the use of the "how-to-do-it" approach and the verbal instructional medium supplementing the nonverbal instructional medium (instructional guideline number 3). The formulation of these instructional guidelines and predicted outcomes were based upon Gagne's description of how the verbal and nonverbal instructional media should be used to enable students to acquire an abstract understanding of scientific phenomena.[6]

The concept, thermoforming, was selected for testing the effectiveness of each instructional guideline. Thermoforming was defined as the process of heating thermoplastic plastic sheets to their shaping temperature, stretching the hot sheets against a mold by the use of air and/or vacuum to exert a force, and using air or vacuum to hold the material against the mold until the plastic had become set.[19,20,21,23]

INSTRUCTIONAL GUIDELINES TESTED

Instructional guidelines 1 and 2 involved the use of a subordinate hierarchy. (See Figure 1.) The subordinate hierarchy designated the subject matter and the intellectual operations, the subordinate tasks, the students were expected to learn. (See Figure 2.) These tasks, organized in hierarchical order, identified the attributes and the interrelationships among the attributes of thermoforming. (See Figure 3.) Each higher-level task was dependent upon students' having acquired an understanding of the adjacent lower-level task or tasks.

The procedure used for developing the subordinate hierarchy involved starting at the highest abstract level, the concept to be understood by the students, and asking the question: "What major discriminating variable or variables (knowledge) would a group of students need to know in order to be able to understand this task?"[2,4,11,18] This question was asked of each of the new hierarchical level tasks identified. This procedure was terminated when the researcher assumed the students had previously acquired an understanding of the lowest subordinate level tasks identified. The researcher's assumptions were validated by pilot studies which were conducted.

The difference between guideline number 1 and guideline number 2 was determined by how the verbal and/or nonverbal media were used. Instructional guideline number 1 involved the use of the verbal codification process complementing the nonverbal codification to communicate information that would result in students' learning each subordinate task. The nonverbal codification process consisted of using symbols, actions, and objects to code physical environmental happenings.[17,22] The meaning of the nonverbal code was dependent upon how the event actually occurred in the physical environment. Thus, communicating information nonverbally required repeating or re-enacting the

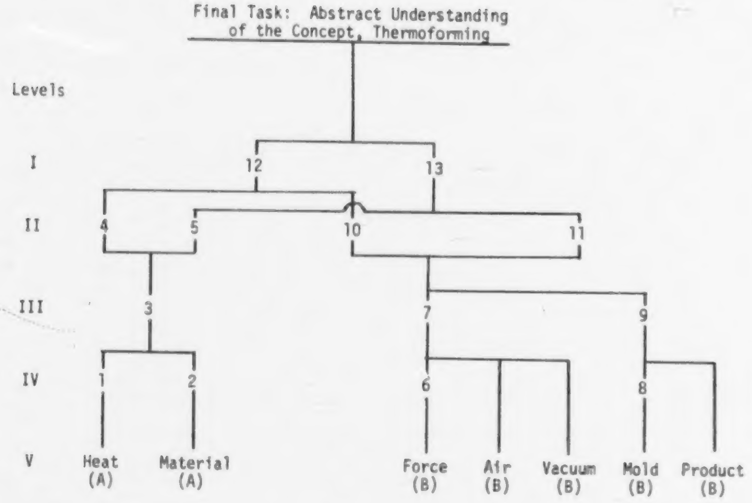


Figure 1. Subordinate Hierarchy Used in Instructional Guidelines 1 and 2.

environmental event. In contrast, the verbal communication system involved the use of letters or sounds to form words. These words were used to form statements or sentences to convey information. How the letters, sounds, words, and sentences were formulated to communicate a specific message was dependent upon a previously developed, man-made logic system. Unlike the nonverbal communication system, the verbal system can be used to describe and explain environmental happenings without the event actually taking place. Thus, the verbal medium can describe and/or code an event, but cannot repeat or re-enact the event.

The complementary use of the verbal and nonverbal medium involved the use of the nonverbal medium to illustrate, by the use of experiments, unique physical characteristics and/or environmental happenings. The verbal medium was used to label (code) the unique physical characteristics and/or happenings, explain why specific environmental events happened, and specify how and why different environmental events had an effect on others. The verbal code provided a means for students to label, record, and recall attributes and interrelationships between attributes related to an environmentally-based concept.

Instructional guideline number 2 involved the use of the subordinate hierarchy and the use of the verbal medium alone. Thus, the verbal medium was used to describe specific physical environmental phenomena and explain why the phenomena occurred, related to each subordinate task. Thus, the verbal medium was used to replace the nonverbal medium used in instructional guideline number 1.

The third guideline involved the use of the "How-to-do-it" approach and the use of the verbal medium supplementing the nonverbal medium. The "how-to-do-it" approach consisted of showing the students, step by step, how to construct different thermoformed products. The verbal medium was used to describe what was being done nonverbally, related to each step being performed. The medium was not used to explain why the step worked. Different thermoformed products were constructed to insure that all the attributes of thermoforming were demonstrated.

Number	Task
	The students will identify:
1	- heating a material describes the process of raising the temperature of the material.
2	- different kinds of materials can be classified as sheets when their thickness is less than their width and length.
3	- heat causes thermoplastic plastic sheets to become soft.
4	- thermoplastic plastic sheets heated to their shaping temperature can be stretched.
5	- cooling causes thermoplastic plastic sheets to become set.
6	- force, defined as work, requires the amount of push or pull to be greater than the amount of resistance.
7	- air or vacuum can be used to exert a force.
8	- a mold serves as an inside or outside model for making an item.
9	- shape, which is produced by a mold, includes the thickness, width, length, and surface detail of a product.
10	- air or vacuum can be used to exert a force which will stretch sheet materials against a mold.
11	- air or vacuum can be used to hold stretched sheet materials against a mold.
12	- air or vacuum will exert a force which will stretch heated thermoplastic plastic sheets against a mold.
13	- air or vacuum will hold stretched thermoplastic plastic sheets against a mold while they set.

Figure 2. Subordinate Hierarchical Tasks Students Were Expected To Learn.

MEASUREMENT OF ABSTRACT LEARNING

Three tests were developed to measure the amount of abstract learning the students had acquired. Previous research done by Gagne and associates was used as the basis for defining the purpose and nature of each test.[2,5,7-16,24]

The first test administered was used to determine how well the students understood the meaning of the attributes of thermoforming. (See Figure 4.) The test required the students to identify the procedure they would use to produce a thermoformed silverware tray. The students' understanding of the words used to code attributes of thermoforming determined whether or not the tray would be produced by the process of thermoforming. The steps, depicting the attributes of thermoforming, were organized from the simplest to the most complex. The degree of complexity was determined by the use of the subordinate hierarchy.

The second test administered was designed to measure the students' understanding of the concept of thermoforming. The students were requested to identify thermoforming and non-thermoforming procedures. (See Figure 5.) For each non-thermoforming procedure, the students were required to select, from a list, reasons for their decision.

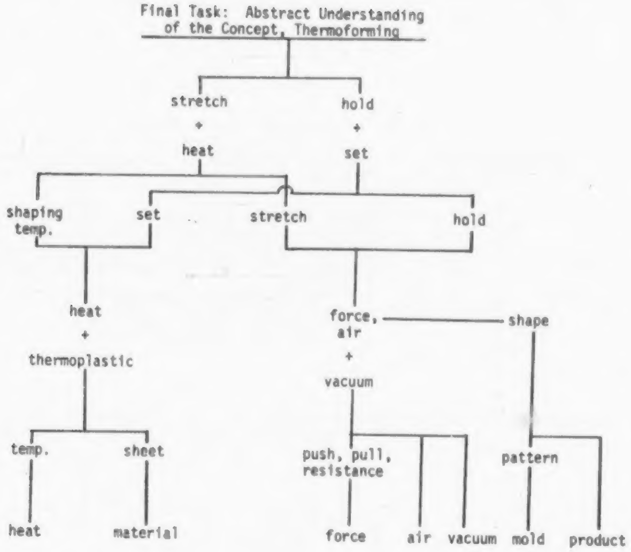

Final Task: Abstract Understanding of the Concept, Thermoforming
stretch
+
heat
hold
+
set
shaping temp.
set
stretch
hold
heat
+
thermoplastic
force, air
+
vacuum
shape
temp.
sheet
push, pull, resistance
pattern
heat
material
force
air
vacuum
mold
product

Figure 3. Attributes and Interrelationship Among Attributes the Students Were Expected to Learn.

Test I

Final Task Test

Directions: ---
---------------------- identify the procedure for making a thermoformed silverware tray. ---
-------------------.

A. The material you would select for making the silverware tray is

   1. Wood (Do question B, page 1)
   2. Plastic (Do question C, page 1)
   3. Metal (Do question D, page 1)

C. The type of plastic you would use is

   1. Thermoplastic (Do question F, page 2)
   2. Thermoset (Do question G, page 2)

Figure 4. Sample of the Directions and Test Items Used to Measure the Students' Understanding of the Meaning of Attributes Related to Thermoforming.

Test II

Transfer Task Test

Directions: Enclosed are descriptions of different procedures for producing products from plastics. --------------------- Write the word true in the space provided for those procedures which involve thermoforming. ------------------------------. For each description marked false, circle the number of the reason or reasons which apply. ---.

False A. A measured amount of thermoset resin is placed in a mold. The mold is heated, pressure is applied, and the molten resin fills the mold cavity. A chemical reaction hardens the resin.

1. A thermoplastic material was not used.
2. Pellets were not used.
3. No sheet material was used.
4. ---------------------------------------.

Figure 5. Sample of the Directions and Test Items Used to Measure the Students' Understanding of the Concept of Thermoforming.

Test III

Learning Achievement Test

Directions: For each multiple choice test item, select the choice that best completes the statement. --------------------------------------- ---.

[These test items were used to measure the amount of knowledge that students had acquired related to subordinate task number 7: air or vacuum can be used to exert a force.]

Q. An air-tight chamber is needed to apply a force by the use of

1. air or vacuum.
2. air or mechanical leverage.
3. vacuum or mechanical leverage.
4. air, vacuum, or mechanical leverage.

R. A force, resulting in work being done, can be exerted when the amount of compressed air is

1. equal to the resistance.
2. less than the resistance.
3. equal to or less than the resistance.
4. greater than the resistance.

Figure 6. Sample Directions and Test Items Used To Measure the Knowledge Students Acquired Per Subordinate Task.

The amount of knowledge the students acquired related to each subordinate task was determined by the use of a third test. The knowledge acquired was measured by the use of two or more multiple choice test items per subordinate task. (See Figure 6.)

PROCEDURE AND SAMPLE

The collection of the data involved administering four treatments to 1,089 randomly selected junior and senior high school students. Three treatments consisted of administering lessons derived from instructional guidelines 1, 2, and 3. The fourth treatment consisted of no lesson being presented to insure that learning occurred. The three lessons

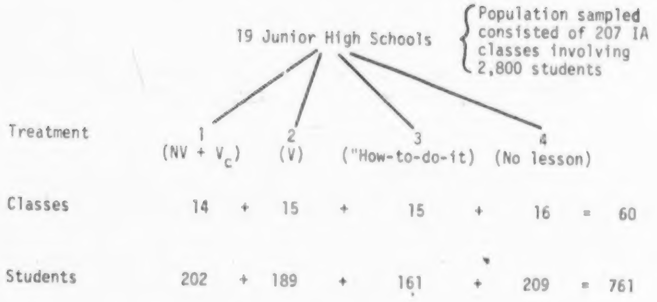

19 Junior High Schools
Population sampled consisted of 207 IA classes involving 2,800 students
Treatment
1 (NV + V_c)
2 (V)
3 ("How-to-do-it)
4 (No lesson)
Classes
14 + 15 + 15 + 16 = 60
Students
202 + 189 + 161 + 209 = 761

Figure 7. Junior High School Sample.

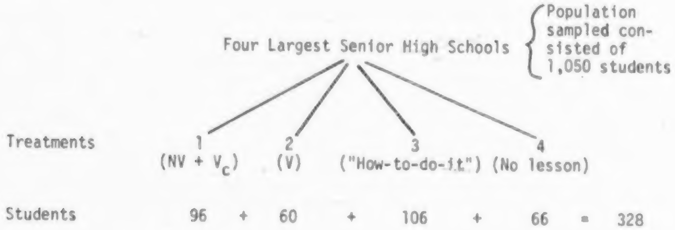

Four Largest Senior High Schools
Population sampled consisted of 1,050 students
Treatments
1 (NV + V_c)
2 (V)
3 ("How-to-do-it")
4 (No lesson)
Students
96 + 60 + 106 + 66 = 328

Figure 8. Senior High School Sample.

were videotaped to control differences between lessons and to insure that each lesson was presented the same way each time. The teachers were not informed to which treatment group their classes were randomly assigned. The videotape medium was used to exemplify normal classroom procedures.

The junior high sample consisted of 64 classes of seventh- and eighth-grade students enrolled in industrial arts, randomly selected from 19 county junior high schools. (See Figure 7.) Industrial arts was a required course for all seventh- and eighth-grade boys. Each junior high school was randomly assigned to a treatment group. Next, 64 seventh- and eighth-grade industrial arts classes were randomly selected. Teacher illness, problems with video tape equipment, and scheduling difficulties reduced the number of classes to 60.

The senior high school sample consisted of students enrolled in Biology I and mechanical drawing courses in the four largest county high schools. (See Figure 8.) Biology, being a required course for tenth-, eleventh-, and twelfth-grade students, included all ability levels. The senior high school sample represented one-third of all the students enrolled in the two courses.

RESEARCH FINDINGS AND CONCLUSIONS

The data collected was analyzed to test three research hypotheses. (See Figure 9.) The third hypothesis was included to validate the findings associated with hypotheses one and two. A one-way analysis of variance and Duncan's multiple range test were used to test hypotheses one and two. A step-wise multiple regression analysis was utilized to test hypothesis number three.

The major conclusion derived at the junior high school level was that the type of instruction did not have a significant effect on the amount of abstract learning (Tests I and II) acquired by the students. (See Table 1.) Receiving instruction did result in the

Hypotheses Tested

1. The students' amount of abstract understanding (as measured by Tests I and II) of a pre-selected technical concept taught by the use of the verbal instructional medium complementing the nonverbal instructional medium (instructional guideline number 1) will be greater than the mean level of abstract understanding of students who have been taught by the use of the verbal instructional medium (instructional guideline number 2) or the verbal instructional medium supplementing the nonverbal instructional medium (instructional guideline number 3).
2. On the learning achievement test (Test III) performances of students assigned to treatments 3, 2, and 1 would be achieved, each at a higher level than the one preceding.
3. The treatment administered would be a significant factor in the prediction of learning capability scores when combined with IQ, standardized achievement test scores, grades in previous courses, and socio-economic status.

Figure 9. Three Research Hypotheses Tested.

Table 1. Summary of Duncan's Multiple Range Test for Determining Significant Differences Among Four Junior High Treatment Means on the Final Task Test (I), the Transfer Task Test (II), and th[illegible]earning Achievement Test (III).

Test	Treatments 1 (NV + V_c)	 2 (V)	 3 ("How-to-do-it")	 4 (No lesson)
I	3.8	3.5	3.1	1.8*
II	8.0	8.0	7.4	5.0
III	19.6	18.1	16.0	15.0

* Any two means not underscored by the same straight line were significantly different ($\alpha = .05$).

students' acquiring a higher level of abstract learning than receiving no instruction (Test III.) Treatments number 1 and 2 had an equal effect on the amount of knowledge the students acquired. Both treatments were significantly better than the "how-to-do-it" approach and the no-lesson treatment.

Regarding hypothesis three, a number of significant variables were identified as being related to seventh- and eighth-grade student performances on Tests I, II, and III. No one variable accounted for a large percentage of the variability.

At the senior high school level, treatment number 1 had a significant effect on the amount of abstract learning (Tests I and II) and knowledge (Test III) the students acquired. The use of instructional guideline number 2 was next best. Treatment 3, the "how-to-do-it" approach, and treatment 4, no lesson, were equal regarding the amount of abstract learning and knowledge acquired.

The treatment administered was identified as the most important significant variable

Table 2. Summary of Duncan's Multiple Range Test for Determining Significant Differences Among Four Senior High Treatment Means on the Final Task Test (I), the Transfer Task Test (II), and the Learning Achievement Test (III).

Test	Treatments 1 ($NV + V_c$)	2 (V)	3 ("How-to-do-it")	4 (No lesson)
I	8.6	6.2	4.1	3.7*
II	13.8	8.98	5.2	6.5
III	26.4	21.7	17.6	18.7

* Any two means not underscored by the same straight line were significantly different ($\alpha = .05$).

for predicting senior high school student performances on the three tests. This finding supported research hypotheses one and two.

Intellectual maturity was identified by the researcher as the variable which accounted for the difference between junior and senior high school student performances. The conclusion was based upon (a) junior high school students having been required to learn the 13 subordinate tasks in 42 minutes, (b) the amount of knowledge senior high school students acquired being larger than the amount acquired by the junior high school students, (c) the large number of significant variables which were identified at the junior high school level which were not identified at the senior high school level for predicting student performances on the three tests, and (d) previous research that has identified that abstract learning is related to human growth and development. Further research would need to be conducted to determine which factors related to intellectual maturity have the greatest effect on abstract learning at different grade levels.

QUESTIONS RAISED

The findings of this study raise some interesting questions regarding industrial arts teacher education. Are industrial arts teachers so dependent upon the nonverbal instructional approach that they are unable to perceive the need for more effective use of the verbal instructional medium? Does the amount of dependency which industrial arts teachers have upon the use of the nonverbal instructional medium result in them being unable to discriminate between the subject matter of industrial arts and the methods for teaching industrial arts? Do industrial arts teacher education programs contribute to and/or result in industrial arts teachers developing a teaching strategy that is so nonverbally oriented that they are unable to perceive the need for the use of the verbal instructional medium?

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On the Concept of Technology

S. F. Kasprzyk

During the past quarter-century, the concept of technology has emerged as one of the major topics of concern among scholars in virtually every field of inquiry. In the literature that emanates from these and other sources, the word 'technology' appears with such frequency that it has literally acquired commonplace status in the English idiom. Unfortunately, as is often the case with commonplace words, the meaning of technology is popularly taken on its face to be self-evident. As such, it has yielded to loose interpretation and indiscriminate usage, which in turn has perverted an indispensable concept and generated confusion among educators and among writers who are seriously attempting to deal with environmental, educational, and other social problems supposedly attributed to technology.

To get to the point, there is an urgent need to clarify the meaning of technology. For in order to know unequivocally what it is we are talking about when we attribute various social problems to technology, we need first find out what technology is. Only by knowing what technology is shall we know whether it is technology that causes the problems; and if so, we shall be in a better position to bring technology under the control of reason. Moreover, we will know what to teach in a technology-oriented educational program; and those whom we teach shall then be better prepared to cope with genuine problems of technology. The problem, then, is one of conceptual clarification: to wit, What is technology?

An ordinary dictionary-type definition will not do; we already have too many of those. What we need is a functional definition. By that I mean an extended statement of meaning, theoretically conceived—one that encompasses a system of interrelated concepts in the context of which the concept of technology can be located and defined. For whatever technology is, it can be defined only in the context of things that are. Aside from fixing its symbolic meaning for precise discourse, a functional definition should furnish a conceptual scheme which can be used to identify and structure the elements of technology for educational purposes.

The object here is to proffer such a definition. For obvious reasons, however, the problem cannot be treated to the extent that it ought to; nevertheless, I shall attempt it by way of a vastly-abridged version of a lengthier work treated elsewhere.*

In the said lengthier work, an inquiry into the origin of the word 'technology' and its meaning in historical perspective and a critical analysis of definitions of technolgy taken from recent scholarly literature on the subject revealed a discernible pattern of common referents which provided a basis for the functional definition to be presented in this paper. On that basis, it was generalized that technology may at once be viewed as a form of human activity and a form of human knowledge—what man does and what man knows. The two views, metaphorically speaking, constitute the obverse and reverse of the same coin; i.e., human activity and human knowledge coexist in a quid-pro-quo relationship, the one mutually complementing and supplementing the other. Hence, whatever else may be said of technology, it is first of all a human concern, something peculiar to man as actor-knower, and its meaning can be defined only in terms of the acting-knowing relationship.

This preliminary generalization narrows down somewhat the scope of the present discussion, for it embraces the aggregate of elements identified in the critical analysis, and at the same time rules out as inadequate those definitions which tend to restrict the meaning of technology to something outside the acting-knowing domain. However, as far as it goes, the generalization reveals little if anything that is peculiar to technology alone. For science too may be generalized as a human concern—i.e., a kind of human activity and a kind of human knowledge. The same may likewise be said of art, of economy, of pol[illegible] of religion, and of other realms of human concern. Hence the task before us is to inve[illegible] a classificatory system which at once embraces all realms of human concern and shows where technology fits into the scheme.

The concept of human activity blankets a broad range of things that man does which doubtless submit to no one tidy system of classification. They might, for example, be grouped according to conscious and unconscious activities, overt and covert activities, mental and physical activities; theoretical and practical activities, work and play activities, or purposive and aimless activities. Although none of these dichotomous pairs is likely to provide an all-embracing system, the latter pair is presumed to be the most useful in establishing a basis for the discussion to follow.

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*S. F. Kasprzyk, The Place of Technology in Industrial Arts Education. (A doctoral dissertation yet to be defended.)

Purposive human activity presupposes aims in mind or ends in view—the things that man does "on purpose." Such activity includes both mental and physical acts, covert as well as overt acts, acts which are consciously directed toward predetermined ends. Aimless human activity, on the other hand, includes mental or physical acts, overt or covert acts, conscious as well as unconscious acts, acts which serve no particular predetermined end. Hence an ongoing human activity need but satisfy the condition of having a predetermined end in view (whether or not it does in fact proceed as planned, or whether that end is or is not ultimately realized) to qualify as a purposive human activity.

Every purposive activity involves an expenditure of effort or exertion directed toward the accomplishment of some predetermined end. The principle applies to both work and play. Both types of activities are purposive by virtue of their having definite ends in view; both involve an expenditure of effort (mental and physical); the latter may be every bit as enjoyable as the former; and the involvement in one could lead to an involvement in the other. But the first, insofar as it is performed primarily for the sake of enjoyment, is play; the second, insofar as its purpose transcends mere enjoyment, is work.

On the basis of the foregoing chain of reasoning, it may be inferred that technology is essentially a form of work.

The further consideration of technology as a form of human work is predicted on the assumption that all human work is basically scientific, or technical, or technological in form. This assumption is central to the present discussion. It means that the concept of technology is categorically consonant with the concepts of science and technic; together they constitute the three basic forms of human work. In contradistinction, the concepts of art, economy, polity, religion, etc., constitute the various realms of human work, and as such are categorically of a different (albeit related) class of concepts. The two classes are in fact so indissolubly related and so open to misunderstanding that their differences must be noted if confusion is to be avoided. In the first place, the basic forms of work are implicit in the realms of work; moreover, the things that man does, the multifarious kinds of work which distinguish one realm from another, can actually be scrutinized and theoretically classified according to the three basic forms of work.

At this stage of its development, the conceptual model may be illustrated diagrammatically (Figure 1) to show at a glance where technological work fits within the framework of human activity.

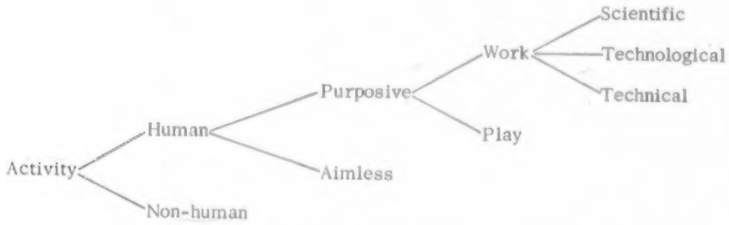

Figure 1. The Place of Technology in the Framework of Human Activity.

Having reached the stage, then, where technology has been identified with the concepts of science and technic as basic forms of human work, it remains now to show how human work of every kind can in principle be classified according to the three basic forms. The seemingly arduous task of providing a conceptual scheme for distinguishing their characteristic differences is facilitated somewhat in that the essential determinants have already been furnished in the foregoing discussion: 1. the concept of work by definition is purposive human activity (which, of course, rules out non-human, aimless, and play activities); 2. the concept of purposive human activity implies the presence of (a) man as the agent or actor, (b) with a tentative or fixed aim in mind (c) actively engaged (expending effort) in doing or producing something via certain means (tools, materials, methods, guides to action) (d) for the purpose of bringing about some desired result or end. This means that every conceivable kind of human work always involves an actor, some aim, certain means, and an end; and it logically follows that if technology, science, and technic are the basic forms of human work which subsume every kind of human work, their distinguishing characteristics should become evident in the light of their respective aims, means, and ends. A scheme for ordering the aims, means, and ends of scientific, technological, and technical work may be diagrammed as shown in Table 1.

FORMS OF WORK	AIMS	MEANS Tools - Materials - Methods - Guides		ENDS
Scientific Work				
Technological Work				
Technical Work				

Table 1. Scheme for Ordering the Aims, Means, and Ends of Scientific, Technological, and Technical Work.

The foregoing conception is a vast oversimplification of this, the second, stage of the proffered model. Although its specific elements deserve extended philosophical analysis, such a treatment would protract the present study beyond its intended limits. Let it suffice to note some of the characteristics which distinguish technical, scientific, and technological work.

TECHNICAL WORK

The many kinds of work that man does in the various realms referred to—artistic, economic, political, religious, medical, military, industrial, and domestic—may be viewed as simple or complex tasks. All human tasks which involve the mere manipulation of things and the requisite skill to manipulate them, regardless of their simplicity or complexity, define technical work. The principle holds for every kind of work, in every realm of human concern. Tasks such as turning a knob to activate a washing machine, or turning a handwheel to adjust an astronomical telescope; sewing a torn garment, or suturing a surgical incision; dicing a vegetable, or cleaving a diamond; writing a letter or penning a novel; budgeting domestic expenses, or calculating the gross national product; they all exemplify human work that is basically technical in form. They all involve the manipulation of things—physical objects, words, or mathematical symbols; they all require an expenditure of effort—physical and mental; and they all may actually be done by anyone—neophite, master craftsman, or specialist in some profession—possessing the requisite technical skill and the means to execute them. They are all technical in form.

Technical work may be done by rule of thumb or according to systematically-ordered rules for doing. A painter may create a landscape painting in accordance with the rules of perspective drawing; a building contractor may erect a house according to the *Graphic Architectural Standards*; a surgeon may remove a human appendix guided by deGraaf's anatomical models; a despot may govern a people according to Machiavelli's precepts. Or they may choose to perform their respective technics by other than prescribed rules. In any event, given the means—tools, materials, and guides to action (be they systematically ordered or randomly selected)—their role as technicians in their respective realms of work is to do or to produce things. Hence, in the hierarchy of the three basic forms of work, technic is the most basic, and is implicit in both technological and scientific work.

SCIENTIFIC WORK

The aim of scientific work is to understand the nature of things, to come to know with the highest possible degree of certainty their natural order and their underlying causes. That being the case, man *qua* scientist desires positive knowledge, knowledge that within the bounds of human powers meets the criteria of truth, proof, and certainty. By means of rigorous methods peculiar to scientific work, man *qua* scientist employs his natural tools—the senses, natural talents, powers of reason—along with his artificial (man-made) tools—logic, mathematics, precise physical instruments—to systematically investigate and study the phenomena of nature (both human and non-human) with the intent of discovering new knowledge or to confirm or disconfirm prior discoveries. The ultimate end of scientific work is positive knowledge: truths in the form of theories and laws, verified in proof through rigorous replication, shared through publication, classified and added to the joint stock of theoretical knowledge. The knowledge thus obtained leads to further scientific inquiry, and provides the groundwork for technological work.

TECHNOLOGICAL WORK

Generally speaking, the aim of technology as a form of human work is to systematize a given technic—any technic. The principle applies to every realm of human work—artistic, economic, political, religious; agricultural, domestic, medical, military, industrial; educational, literary, mathematical, rhetorical. All of their respective technics can in principle be reduced to a system. One who functions in the capacity of a technologist selects whatever theoretical knowledge he deems essential to a given technical problem and transforms that knowledge into a system of guiding principles and expedient rules for doing or producing something. In that capacity, he must have a thorough understanding of the technics he aims to systematize, and must likewise be fully cognizant of the theoretical knowledge related thereto if the guides he prescribes are to prove effective in bringing about desired technical ends.

The foregoing brief consideration of technology as a form of human work should suffice to bring the conceptual model to its final stage of development. At this stage the scheme for ordering the aims, means, and ends of scientific, technological, and technical work can be used to illustrate synoptically some of their principal distinguishing characteristics. (See Table 2)

FORMS OF WORK	AIMS	MEANS		ENDS
Scientific work	To know that . . .	Methods, tools and skills characteristic of discovery	Guided by rules of systematic inquiry	Hypotheses, theories and laws
Technological work	To know how . . .	Methods, tools and skills characteristic of invention	Guided by theoretic knowledge and by effectual practice	Systems of precepts and rules
Technical work	To do or produce	Methods, tools and skills characteristic of production	Guided by systems of prescribed rules, or by rule of thumb	Things done or produced

Table 2. Schematic Illustration of the Principal Characteristics of Scientific, Technological, and Technical Work.

The conceptual model as illustrated is of course vastly oversimplified. But then, the illustration is intended merely as a device to bring some of the aforetreated concepts into perspective, and more importantly, to show at a glance the interrelationship and interdependence of scientific, technological, and technical means and ends.

To conclude then, technology may be defined briefly as a form of human work concerned with selecting and systemizing knowledge for some ulterior use. So defined, technology embraces the original ancient meaning of the word (viz., systematic treatment of technics) as well as its modern acceptations in careful usage. Thus it satisfies the criterion of appropriateness as judged by its history, and at the same time does not glaringly violate received usage. By locating technology in the framework of human activity and defining it as a form of work, we have attempted only to sharpen the meaning of an important concept—to make explicit what in careful usage has heretofore been implied by both ancient and modern writers.

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Implications of Technology for Industrial Arts

Lee H. Smalley

If we accept the definition of technology as Mr. Kasprzyk has just explained, there would seem to be many implications for teachers and students in industrial arts. Some of the examples will be related to the other two themes of the meeting, the environment and urban education, but it should be obvious that the implications are broader than those two, and you may provide your own examples that may more adequately fit your own interests and limitations.

There is one principle that I want to reaffirm: Basically, industrial arts has to remain a laboratory hands-on activity type of program. If we look at the rest of the school curriculum and the way young people learn, it becomes obvious that this principle would be discarded at our peril. The great challenge for teachers is to translate concepts and information that they have learned intellectually and verbally into an activity type of curriculum. This is especially true of some of the newer technological concepts. For those teacher educators who are teaching concepts of technology, this also offers a challenge if they ask themselves, "Do I want these teachers to teach students in the junior and senior high school the same way I have taught them?" If not, then what are they doing to teach them a different way?

Technology has implications for industrial arts in all of the areas that affect decisions in teaching: aims and objectives, selection of content, organization of instruction, methods of instruction, instructional materials, physical facilities, materials, etc. What this involves is a re-orientation from selecting content from the mechanical trades, as we have been doing since the 1880's, to preparing people to live and function in a Twentieth Century, highly industrialized democracy. It might help if we approached this problem with the same rules that would apply if you were to start to eat an elephant. (1) You have to start biting somewhere; (2) it probably doesn't make much difference where you bite; and (3) after you have eaten a lot, most of the elephant will still remain. The difference is immense; the task is enormous; but, the stakes are high. So, let's make a run for it, and see if we can bite off a little bit of the problem.

PROVIDE FOR PRACTICING A METHOD OF THINKING

Need to think technologically

Just as there is a scientific way of thinking, so there is a technological way of thinking to know how to do something efficiently. Utilizing rules derived from scientific principles implies that some science is either taught or utilized. Devising pollution control or measurement devices would utilize principles of science. This would seem to be an especially appropriate activity in the urban environment.

Confrontation with concrete problems

There is no use arguing with a joint that doesn't fit or a machined piece that is undersized. There is an advantage in being presented problems that won't be talked away or just won't fade away. They are there, and remain, until you solve them. The playground remains full of glass until it is picked up, and rats remain as long as there is garbage to eat. Getting from "what is" to "what should be" involves technology.

The innovative and perceptive teacher is one who will take some realistic, concrete, immediate problem. By applying a technological fix, the problem may be solved or at least adjusted to tolerable limits. Utilization of waste material in a shop environment could be such a challenge.

Use of mechanical technology as examples

Not everyone can think or operate most effectively in the theoretical or verbal area. Industrial arts provides a valuable service to students who need actual, visual examples upon which to focus. Reclaiming aluminum cans provides an example of a method of thinking that can prove valuable. Plans can be carried out, models made, and some proof or evidence gathered to indicate whether the original idea was valid or not.

PROVIDE FOR A DIRECT LINK WITH VALUES

Contemporary technology assessment

In an assessment of a technology, value decisions must be made in making trade-offs. Will an airport do more damage to the environment than it will do good for the airline passengers? How valuable is noise abatement, clean air, available public transportation? Drafting classes may provide a good educational setting where these questions could be asked and decisions made, not just on the basis of information that is available, but upon certain values that the designer/draftsman holds to be important. Any invention, refinement, or product design problem should provide this direct link to values.

Vehicle for future forecasting

Many of the scenarios being written toward the future focus upon the implications of the mechanical and physical changes. New modes of transportation and communication can focus on a future orientation better than a moral or ethical change. Students can design environments in which they would like to live, work, and play. They can also suggest activities and decisions that will have to be accomplished in order for these prophesies to be realized.

Need for value decision

The point needs to be made each day that things just don't happen—people make them happen, and part of this happening is because people valued it to be so. There is a way to get action, if it is valued, but the commitment has to be there. Can our streets be safe? They can if we value it enough, and part of the answers will usually be technological. Do we value cheaper products, and if so, what are we willing to pay for them? Everything has its price. There is no such thing as a free lunch! Can students design products and environments that reflect a value decision? Obviously, they had better.

PROVIDE A PERSPECTIVE

Historical United States

Things have not always been what they are now. In order to get a better idea of where we are now, students need to know where we have been. Some actual hands-on activities can be developed so that the evolution of tools and machines can bring about a historical perspective. The older one-lung engines could provide an example of workmanship, accuracy, weight-efficiency ratio, safety, simplicity, etc., to compare with more modern motors and engines. It is not a matter of one being "good" and the other being "bad," but to show that we have not always been where we presently are.

With other parts of the world

As we become more dependent with other countries in the world, it becomes increasingly important that Americans understand how our society compares with other countries. By studying the mechanical technology of other countries, and attempting to duplicate some of their present techniques, this may be achieved. Hong Kong has produced many commercial products from used tin cans. How do they do this? What are the implications of a labor-intensive product as opposed to a machine-intensive process or product?

Of themselves

By working with technological problems and technological solutions, students should get a better idea of their interests and aptitudes for working to know (science), to know how (technology), or to do (technic). This should not be just left to chance, but should be a conscious and visible objective, taught for, and evaluated. This is not only a judgment by the instructor, but an analysis by the student himself.

Things is a'changing! Each teacher should go through the following sequence at least every other year.

1. List the changes that have occurred in the last ten years in our society.
2. List the additions we have made to the formal school system in the past ten years.
3. List the things we have stopped doing in education the last ten years.

4. What are the correlations between the changes in our society and the changes in education?

Because things technologically have changed in the last ten years, then it becomes necessary, if we are to relate to technology, for industrial arts to change. This should not be a controversial thesis. How are we to change? Hey, I'm willing to talk about that one!

A poem titled, "Postgraduate", by Stanley Kiesel ends with this admonition:

> Teachers of tomorrow,
> You far-reaching, super-excellent
> Short order cooks for the common denominator,
> Lift up the world's dress and look!

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The Learner and Personal Autonomy

John P. Schenck

This session focuses on such an immense topic that for a while it was difficult to identify a single agendum for your consideration. The dilemma was resolved quite by accident when I happened across a statement attributed to Aldous L. Huxley to the effect that the survival of democracy depends on the ability of great numbers of people to choose rationally from among alternatives based on adequate information.

This thought led finally to what seems to me to be the most ubiquitous and emotion-laden issue in education in general and industrial arts in particular; namely, student needs. I refer naturally not to physical needs, but to what may be called personal autonomy needs. Now, some of you are thinking, "Well, I paid my money and I took my chance." Others are being less charitable. But I submit to you that in a free society the capacity to resist manipulation cannot be left to chance. The learner must be prepared deliberately and conscientiously to be a free agent. I am aware that there are those in our society who consider personal autonomy to be tantamount to permissiveness at best and license at worse. But a free society has the ability to absorb a variety of world views and is probably the better for them.

Submitting to manipulation is not limited to naive learners. The siren call of organization, "Get on the team," also is difficult to resist for the learned.

Consider, if you will, an occasion at the national level when bright and perceptive men failed to exercise personal autonomy and succumbed to the manipulation of misplaced loyalty. I refer to the decision to invade the Bay of Pigs. The invasion was doomed from the beginning, and the individual minds who concurred in the decision considered the possibility of failure. Why then was there no substantial dissent? A Yale psychologist, Irving L. Janis, examined the phenomenon and concluded that concurrence-seeking and "we" feelings of solidarity were running high. To these pressures to conformity, he applied the nominal label "groupthink." According to Janis, groupthink has several dimensions: (1) a collective effort to rationalize a decision; (2) an illusion of invulnerability; (3) an unquestioned belief in the group's inherent morality; (4) a stereotyped view of the opposition as warranting no real attempts at negotiation; and (5) the protection of self-appointed mindguards. The mindguard is especially important to the suppression of critical thinking and speaking, because he must protect leaders from thoughts that might undermine their confidence in the viability of the policy that they are about to institute.

"So," you say, "big deal. How many Bay of Pigs decisions will my learners be involved in?" Probably none. But I suggest that there are now pressures on learners to conform to world views and interpretations of reality that demand critical analysis. All of us are aware of one special interest group or another that is trying to persuade learners that its particular brand of the proper ends and means of education, religion, economics, industry, society, law, politics, etc., ad infinitum, ad nauseam, is the true one. And in all honesty, I admit that at this moment I am pedaling a particular interpretation of reality.

If the preceding briefly rehearsed points are valid, then it follows that my original contention, that learners must be prepared deliberately and conscientiously to resist manipulation, must be a concern of all educators in a free society. To that end, I shall address my closing remarks to communications that are intended to manipulate; i.e., to convince one to select a specific course of action; to react rather than respond.

In order to resist a communication that is meant to manipulate, the learner must first recognize it as such. The clue, of course, is that the communication will deal favorably with only one alternative among many. Television commercials are probably the most notorious and abusive examples. Some commercials do admit the existence of competitors, but, like the bad guys in grade B westerns, they always lose.

Such communications need not be blatant in their appeal. Some are cloaked in dignity and sincerity, and by their apparent straightforwardness hope to win learners' allegiance. Some come disguised as self-evident truths. But however garbed, these communications arrange themselves so that to select a competing alternative comes off no better than taking leave of one's senses.

Once our hypothetical learners have identified a communication as intended to manipulate, they must separate its illogic from its assumptions from its facts. Illogic is statements that hope to elicit a conclusion by violating some law of thought. Classic examples are appeals to emotion, tradition, and authority; the craftsman's bias; and of course, statistics of vague origin. Now, it is probably true that our learners will need considerable instruction in logic to avoid the pitfalls of illogic, but there is a suitable interim measure available. Rudolf Flesch, that prolific writer on the art of clear thinking, suggests that learners ought to keep asking two questions of any communication: "Why?" and "So what?". If the answers are not satisfactory, the communication should be held suspect. The reference to Flesch, by the way, was an appeal to authority.

Assumptions are the taking for granted of *what is*, *what will be*, and/or *what ought to be*. What is is easily enough tested, but often is not if a communication originates from a knowledgeable source, which learners usually consider authority to be. What will be most often involves a series of "if . . . then . . ." propositions or forcing causal relationships. Assumptions of what ought to be stem from motives, the unconscious, and a host of other factors that do not lend themselves to objectivity. Impugning another's beliefs is a sure way to generate opposition and raise defense mechanisms. Sometimes a review of evidence helps, sometimes it does not – depending, probably, on the intellectual honesty of the parties involved.

Facts are easily enough checked, and schools can be a primary source of facts to our learners. Sadly, though, schools are too often involved in originating communications intended to manipulate to want to supply facts that require explanations. But facts must be given top priority in evaluating communications. Particular danger inheres in instances when those who hope to manipulate also control access to facts. In which case, our learners will have to make do with what they have unless they are quite willing to jeopardize their position or standing.

Now that our learners have reached a point at which they can choose or reject a specific alternative on a reasonably educated basis, should they press the "go" or "no-go" button? I think not. Even the analysis thus far may not account for an adequate number of variables and constants, and failure to include them in a decision-making equation inevitably leads to an acute attack of myopia. Whether pragmatism in politics, discipline in education, or profit in industry, failure to consider but one or two factors contributes to simplistic solutions to complex problems.

With the tools to evaluate communications that are intended to manipulate come at least two responsibilities. First, the learner must challenge the originator of the communication if its facts are distorted, it contains illogic, and/or its assumptions do not square with those of the learner. He or she must eschew the security of silence and speak out. Which means that all of us, whether playing the role of teacher, parent, or public official, should expect to be taken to task frequently.

Second, the learner has the responsibility to tolerate the diversity of alternatives chosen by others after they analyze a communication. I certainly hope that we do not leave our learners with the impression that each of them has chosen the only correct alternative and that they must set about to originate communications intended to manipulate others to their point of view. Our society already has more than its share of people who believe that they have chosen the one and future alternative.

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The Industrial Arts Program for the Early Adolescent

Alan R. Suess

The twenty-first yearbook of the American Council on Industrial Arts Teacher Education dealt with Industrial Arts for the Early Adolescent.[1] Specific chapters considered the physiological and personality factors of early adolescents, educational purposes, administrative pattern, curriculum considerations, programs, and finally case studies of outstanding programs throughout the United States and Canada. This presentation will center on the industrial arts program as it is currently being offered in the schools of the nation.

To facilitate discussion, industrial arts programs in contemporary schools for the early adolescent were divided into two categories. The programs were classified as either traditional or developmental. Traditional programs were further divided into skills emphasis, pre-vocational emphasis, and leisure-time emphasis categories. Developmental programs were categorized as either evolutionary or revolutionary.

Definitive descriptions of a wide majority of the programs included in the traditional category were very difficult to obtain because of the lack of publications describing the offerings. As a result, some of the discussion is based on indirect measures of the programs. For example, a review of widely distributed catalogs of industrial arts supplies and the advertisements in the national magazines for industrial arts and vocational education teachers provided a good deal of information that described the nature of the equipment and supplies desired by practitioners in the secondary school classroom.

The skills emphasis of a great many traditional programs of industrial arts for the early adolescent has strong historical precedence. The early leaders of manual training were concerned with building skill in the use of tools and machines for the processing of materials. Current offerings are far more general than the offerings of our forefathers. However, the emphasis upon developing skills is just as great in a current course titled "Wood Technology" as there had been in the "Cabinetmaking" course that grandfather took as an adolescent.

One of the most discernible trends in the skills emphasis program has been the abandonment of the general shop organization. Laboratories devoted to the processing of a single material have been built to replace the older multiple-activities facilities. While the trend has been away from the specific course titles to more general offerings, the current program is most frequently taught in a facility equipped for only one technical area. Thus, while a modern graphic arts program is immeasurably more comprehensive than a manual training course in typesetting, graphic arts courses are typically the only ones offered within the laboratory facility. If a course in metalworking is offered, it will likely be housed in facilities specifically devoted to metalworking. This development has made possible more in-depth offerings within the many areas of industrial arts.

Another important type of industrial arts offering for the early adolescent is the program with a pre-vocational emphasis. Activities, facilities, text materials, and equipment used in pre-vocational industrial arts programs are often identical with those used in a skills-emphasis program. The major difference is the deliberate attempt to articulate the program for the early adolescent with the programs of vocational education available for the late adolescent and young adult. Recent changes in several state plans for vocational education have fostered the growth of these programs because of the availability of federal funds.

Exact patterns of pre-vocational program organization and content coverage are as diverse as are the programs in the skills-emphasis category. The pre-vocational program may be a thinly disguised first-year vocational program, with little attempt at presenting an overview of the many aspects of the total field of study. On the opposite end of the continuum are programs that offer skillfully blended introductory experiences designed to give early adolescents an idea of the types of activities that will be part of selected occupations.

Programs stressing leisure-time activities comprised the third major type of traditional industrial arts program. Program justifications most frequently revolve around either the worthy use of leisure-time or the natural motivation attendant with utilization of activities that are pursued for their intrinsic benefits. Programs include the range of activities identified as leisure-time pursuits. Frequently there are regional similarities in offerings. For example, leathercrafts are widely taught in the southwest. Other programs are built around the leisure-time interests or skills of the individual instructor. The differences are greater than the similarities in the programs, but all are based on someone's conception of viable leisure-time activities.

Activities that are part of all three traditional program organizational patterns deal with some aspects of life and work in a modern society. However, a substantial number of industrial arts specialists have challenged the ability of traditional organizational patterns to teach about the world today. The result has been that a great deal of developmental effort has gone into building programs that stress current conditions in society in general, and industry in particular.

Many individuals in this audience have such good memories that they can still remember when substantial funds were available to underwrite program development. These funds made it possible to devote varying amounts of time and resources to the development of curriculum materials. These developmental efforts were in many ways similar, but in other ways very different from each other. Discernible differences were apparent when the extent of funding was evaluated. For this reason, the programs were evaluated according to the available funding.

Programs with substantial funding were, in general, very innovative. The materials developed reflected the time, resources, and editing that are possible when sufficient funding is available to allow careful conception and evaluation. Since most of the innovators who were working on projects that were well financed were able to devote all of their energies to the development of new materials, there was a discernible independence from earlier offerings. In short, the programs were revolutionary attempts to alter the industrial arts program for the early adolescent.

Several individuals who were interested in innovation and change were not able to secure funding at the level of the major projects. Nevertheless, the diversity of funding resources made it possible for several groups of innovators to secure monies to underwrite less comprehensive curriculum revision efforts. A number of these innovators were as talented at stretching their financial resources as they were in creating new instructional materials. The less-well-funded programs reflected the restraints of trying to serve several masters. Despite their high over-all quality, these materials tended to be evolutionary in nature. That is, they built on established practice rather than working from markedly new positions.

Diversity of program, philosophy, and resources all lead to problems of articulation. Articulation between teacher educators and secondary practitioners, between high school and junior high/middle school teachers, and ultimately between all members of our profession, other educators, and the general public is imperative. Nowhere are the problems of articulation more apparent than in the emerging middle schools of the nation. As Householder so succinctly stated: "To be fully effective, the unified arts program needs to have a degree of melding which is perhaps difficult if not impossible of attainment."[2]

Articulation between school subjects is important for all. If there had been effective articulation in the past, it would not have been necessary to propose a career education program. Industrial arts can help teach mathematics, science, English, and social studies. Conversely, the content of mathematics, science, English, and social studies can enrich industrial arts. Unfortunately, selfish gains frequently motivate teachers. The science teacher who demeans the "shop" class and teacher is all too eager to have his Science Fair participants construct the necessary apparatus and display materials in the industrial arts facility. "Lif dat flat, tote dem chairs, print dos programs" is a song frequently sung by the dramatics coach in the presence of the industrial arts teacher. The goal is not articulation of programs, but rather of finding a low-cost way to produce the school play.

Frequent problems of articulation between levels are also a deterrent to effective programs. Lack of cooperation and understanding often flaw effectiveness between the middle school/junior high school and the high school program. Since the audience contains mostly industrial arts teacher educators, no mention will be made of the dilution of effectiveness created by the inability of teacher educators and classroom teachers to work effectively toward common goals.

In conclusion, Karnes[3] plea to improve or perish was originally made in 1959. If the materials presented here today and at other activities of this convention do not convince those of you in the audience that there is still a long way to go to improve our offerings, then perhaps the more dire of the two alternatives presented 14 years ago will come true.

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Differentiated Student Teaching

Wayne H. Zook

Luvern R. Eickhoff

The Department of Industrial Technology at the University of North Dakota has endeavored to broaden the pre-service experiences of its prospective graduates through an experimental student teaching program. This experiment was stimulated by the concept of career education, which has been the topic of untold hours of pedagogical discussion for the past few years. This week has certainly not been an exception, as career education remains paramount in the minds of all of us. At our institution, career education has become a focal point in the preparation of industrial arts teachers. We have evaluated our curriculum and have repeatedly asked ourselves the question, "Will our prospective teachers teach in terms of career education?"

Answers to our own questions did not necessarily satisfy us. We then looked at the alternatives. Some of the alternatives would have required the total revision of our curriculum. This was not undertaken because of the magnitude of the task and uncertainties which could result, since it would definitely be experimental. A total curriculum revision requires a number of years before the results can be evaluated, and we thought time was of essence in this case. It definitely appeared that we wanted the maximum return with a minimum of risk to our program and also through a minimum of permanent restructuring.

Our attention was then focused on the student teaching aspect of teacher preparation. The attempt at this point was to establish an experimental model as a solution to the problem by involving only the student teaching aspect of our program.

The model evolved into what we term, "differentiated student teaching." For the purpose of explanation, we would like to identify the term, "differentiated student teaching," as being related to the total spectrum of student teaching in industrial arts at all levels of education, K through 12. Under the system of differentiated student teaching, the student teachers involved spend part of their assigned student teaching experience in an elementary school, junior high school, and senior high school.

One definite outcome is that the students can obtain employment at the level at which they function most effectively. It provides information and experience on which teachers can base their decision as to the grade level they will teach. In essence, it becomes a form of career education in the teacher preparation process, as well as being concerned about the ways our own people will in turn be teaching career education at the junior and senior high level as well as the elementary school level. More importantly, our student teachers will have an opportunity to refamiliarize themselves with the elementary school program. For the beginning educators, their last exposure to the elementary school was their own education on this level, 10 to 15 years earlier. There have been many changes, of which the industrial education teacher should become aware. In the elementary school, the concept of the free school prevails in some areas; in other cases, it is an opportunity for students to experience both conventional scheduling and modular scheduling. Unfortunately, for most in-service industrial education teachers, this exposure to the other grade levels of the school may even be more removed. Exploration of the total educational system by industrial education teachers results in the exposure of the teacher to educational methodology and instructional materials which may have direct application to their own subject matter.

With this assumption in mind, we attempted to pursue a different approach to student teaching. We will assume that education is a process of preparing youth to accept a productive role in society, and that all educators must be working together for the same end. We feel that the segmentation of education into closed classrooms can nearly be compared to the concept of faculty psychology. It therefore seems not only conceivable but practical to expand the prospective teacher's concept of education by student teaching at many different educational levels, providing them with the cognitive, affective, and educational skills which may later affect their professional choice in regard to a teaching position. The rationale which supports this idea seems sound, in that it is an effort to alleviate the relative narrowness which occurs in the process of preparing educators or educational specialists in the various disciplines. Even industrial arts teachers will identify themselves as electronics or metals teachers, for example, rather than industrial arts teachers. Even fewer identify themselves as teachers of kids.

The consequence is that most educators find their niche in the educational scheme and remain unaware of the total educational progress. All too many educators are unaware of what is being taught by other teachers or the learning capabilities of students in the various grades from K through 12.

Most industrial educators, due to some preconceived notion, declare themselves to be either junior or senior high school teachers. Their first teaching position is often at one level or another, and they spend their entire career in virtually the same status, the reason probably being that they are comfortable working at this particular level and they are uncertain of their own ability to function at other levels. This is unfortunate, as many would undoubtedly function even more effectively at other levels.

The choice future education graduates, and industrial education graduates in particular, will make as to becoming a junior or senior high school educator is often correlated to their own student teaching experience. If they are successful at one level, they will most likely seek employment at that level. They tend to stereotype themselves as a junior or senior high school teacher, based upon this one experience. This is not objectionable if the students has been exposed to several alternatives, but when it is only one it may be unfortunate. With rather limited data on our own program, it appears that we could generalize that some young people with high potential will remain in teaching due to the exposure which they have had to different age groups while student teaching, whereas one unfortunate experience for an entire semester without some good experiences may be enough to curtail some prospective teachers' interest in further pursuing education.

There have been some cases where the first student teaching cycle on a particular level may have been very distasteful. During the second and third cycle, the experience may have been much better, because the prospective teacher found the level and type of program for which he was best fitted. Often student teaching has in the past been a make-or-break situation. With the differentiated program, he has three chances and can benefit from his previous experience and maybe even mistakes.

If career education is actually an on-going process, teachers must be made cognizant of the learning capabilities of students of all ages and be aware of their previous educational experiences.

To overcome this rather voluntary self-stereotyping which tends to occur among industrial education teachers, the Department of Industrial Technology at the University of North Dakota has endeavored to broaden the pre-service experiences of its prospective graduates through differentiated student teaching.

Differentiated experiences occur through time-staggered exposure to students of various grade levels in the various areas of industrial arts. This experiment has been in progress for the past three semesters; however, to date it is only one of several options available to our industrial technology majors.

The options which the students may elect would be to student teach at one level for the full duration of time or to student teach at two or more levels of education. The ultimate choice as to which program the student will select is left to the student after being advised of the advantages and disadvantages of each alternative.

It is important at this point in time to mention that the idea of student teaching two or more levels is by no means new. It is likely that many of you had a similar experience in your own preparation, but maybe the intent was different.

Our concern here is to bring about an awareness on the part of the prospective teacher as to the level of education for which he might best be prepared to function, based on his own expectations of students as a teacher.

It is important for a high school teacher to be aware of what is being taught in the junior high and elementary school, and vice versa. A knowledge of what the students have been exposed to in their previous education can alleviate the costly duplication of instruction which often occurs in our educational program. This duplication occurs because we are not aware of what a student has been exposed to previously.

This program is two-fold in nature, since it provides the teacher with a better understanding of his own capabilities and interests from the standpoint of the total educational spectrum and also provides him with the background essential for providing career education for the students at the level which he selects to teach in the future.

Prior to the development of this model, a review of student teaching practices from the standpoint of administrative procedures was undertaken. The results show that some institutions have very highly structural programs and others are rather lax. The variation is most evident in regard to the assignment of the prospective student teacher to a station and the degree of college supervision after the students are assigned to the station.

The method of assignment may vary from a random assignment to a very sophisticated method of matching the prospective student teacher's competencies and interests to a specific station.

In other cases, the assignment is made by an office of clinical experience serving an entire college, often with no consideration given to students' interests or competencies because of the scope of the task of identifying these factors. Needless to say, the value of the student teaching experience is highly correlated to the appropriations of the assignment.

The other factor of administration and responsibility involved with student teaching is that of supervision. This method also varies greatly from one institution to another. In some institutions, the responsibility for supervision is left to the department. In other cases, the responsibility for supervision is left to the office of clinical experiences and the station is supervised by persons not always cognizant of the various disciplines involved. This method of supervision is thought to be less than desirable by most departments.

The degree of supervision then varies from none to, in some cases, weekly supervision. The supervision is important and no doubt should be given as high a priority as other teacher preparation functions.

The University of North Dakota fluctuated as to its supervision and assignment of student teachers in regard to the number of visitations by a supervisor and the sophistication of the assignment.

However, with an acute shortage of staff and enrollment increases, the problem was often overlooked, and the department's commitment to student teaching was often given a second-rate priority.

About three semesters ago, we decided that this was all too important an aspect of the teacher preparation to leave to chance. At this stage, we were concerned with the continuity from one semester to the next, which also influenced our decision to reorient our student teaching program.

One means of achieving this was to make student teaching a major assignment for one staff member. Prior to this time, the supervision responsibilities had been divided among the entire staff, and they were expected to schedule visitations around their existing campus responsibilities.

The next phase of reorientation was to establish concrete goals to be achieved in regard to our students' student teaching experiences. This immediately brought to mind the question which has often surfaced in the profession as to what is the difference in the program for the preparation of teachers for the various levels from K through 12. A review of various college catalogs showed that very few program variations exist in most schools to compensate for any necessary difference in preparation.

Both questions were given very nebulous answers, and the commitment or the program alteration at our institution was not carried any further. This has been the case in most institutions. The discussion then centered on "What is the major trend in education?" The answer was obviously career education.

Thus, career education again became the focal point for our consideration of our student teaching program. It was felt that this may be the simplest means of at least making an effort to prepare teachers for various grade levels without major alterations of our existing curriculum.

We recognized the apparent need for our graduates to have experiences with students in grade levels from K through 12. This resulted in the structuring of revolving time cycles involving the cooperating station in the public school and the student teacher assigned to the station.

Since the semester is generally 18 weeks long, the decision was to assign a student teacher to each of three stations. The student teaching time was divided equally, meaning that a student would remain in each station for about five to six weeks.

The establishment of the appropriate relation with the supervising schools and building the schedule was the difficult aspect of the project.

EXPERIENCE CYCLE #1

STATION: Ben Franklin
COOP. SUP.: C. Zick
UNIV. SUP.: L.R. Eickhoff
STUDENTS:

Time Cycle 1	Mark Bohn
Time Cycle 2	Douglas Holm
Time Cycle 3	David Carl

STATION: Schroeder Jr. H.S.
COOP. SUP.: Wm. Youngquist
UNIV. SUP.: L.R. Eickhoff
STUDENTS:

Time Cycle 1	Douglas Holm
Time Cycle 2	David Carl
Time Cycle 3	Mark Bohn

STATION: Central H.S.
COOP. SUP.: Verl Clark
UNIV. SUP.: L.R. Eickhoff
STUDENTS:

Time Cycle 1	David Carl
Time Cycle 2	Mark Bohn
Time Cycle 3	Douglas Holm

EXPERIENCE CYCLE #2

STATION: West Elem.
COOP. SUP.: Jerry Abbot
UNIV. SUP.: Dr. Wayne Zook
STUDENTS:
Time Cycle 1 Richard Anderson
Time Cycle 2 Lowell Fruhwirth
Time Cycle 3 Steven Satermo

STATION: Valley Jr. H.S.
COOP. SUP.: Bertrand Egstad
UNIV. SUP.: Dr. Wayne Zook
STUDENTS:
Time Cycle 1 Lowell Fruhwirth
Time Cycle 2 Steven Satermo
Time Cycle 3 Richard Anderson

STATION: Red River H.S.
COOP. SUP.: Vern Mason
UNIV. SUP.: Dr. Wayne Zook
STUDENTS:
Time Cycle 1 Steven Satermo
Time Cycle 2 Richard Anderson
Time Cycle 3 Lowell Fruhwirth

EXPERIENCE CYCLE #3

STATION: Kelly Elem.
COOP. SUP.: Larry Hoiberg
UNIV. SUP.: L.R. Eickhoff
STUDENTS:
Time Cycle 1 Kenneth Head
Time Cycle 2 Donald Kartes
Time Cycle 3 Rodney Scherbenski

STATION: South Jr. H.S.
COOP. SUP.: Arthur Hillman
UNIV. SUP.: L.R. Eickhoff
STUDENTS:
Time Cycle 1 Donald Kartes
Time Cycle 2 Rodney Scherbenski
Time Cycle 3 Kenneth Head

STATION: E.G.F. Central
COOP. SUP.: Roger Paskvan
UNIV. SUP.: L.R. Eickhoff
STUDENTS:
Time Cycle 1 Rodney Scherbenski
Time Cycle 2 Kenneth Head
Time Cycle 3 Donald Kartes

EXPERIENCE CYCLE INTERVALS

Time Cycle 1: Sept. 11 - Oct. 13

Time Cycle 2: Oct. 16 - Nov. 10

Time Cycle 3: Nov. 13 - Dec. 15

INDUSTRIAL ARTS: Grades 4, 5, & 6

TIME	MON.	TUES.	WED.	THURS.	FRI.
9:30		Bina		Bina	Fluvog
9:40					
9:50	Graveline		Graveline		
10:00		Merritt		Merritt	
10:10					
10:20					
10:30					Bina
10:40					
10:50	UPSTAIRS (grades 1 - 3)		UPSTAIRS (grades 1 - 3)		
11:00					Fluvog
11:10		Wilson		Wilson	
11:20					
11:30					Willey
11:40				Willey	
11:50					

between 5 and 10 students per time period

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AIACSA

Professional Sequence for Professional Development

W. A. Mayfield

Recently I was browsing in one of the new publications in our field. There were many topics related to preparing students to be teachers. I came upon one paragraph that dealt with professional organizations. I was stunned at the ignorance exhibited by the author of that book as he attempted to relate to students the importance of professional associations. He spoke of the teacher and the professional associations as if they were two separate worlds instead of showing the student that our professional associations are headed by those same individuals responsible for teaching.

I received a letter this semester from a student majoring in industrial arts who had been contacted to organize a college student chapter at his institution. In that letter, this young man related a situation that portrays one of today's most tragic shortcomings in education. He said,

> Dr. Mayfield, we have several students interested in organizing a chapter, but we don't have a faculty member willing to work with us, and to have an organization on our campus we are required to have a sponsor. They all told us student clubwork wasn't important enough to justify the time, effort, and cost. Yet, these same faculty members tell us that when we get out in the teaching field we must be enthusiastic with our students and support our professional organizations. One question, Dr. Mayfield; why can't we start learning how to be professional while we are still learning how to be teachers? Or do you just wake up some morning and find you have turned into a professional?

I think this young man has not just put his finger on a professional shortcoming; he has identified a disease that has almost eaten the heart out of education. That hardware-content-oriented individual who has been granted a degree and a teaching certificate, in many cases, does not know how to function effectively with students. This same individual lives within an atmosphere where students are just a necessary evil in the classroom. Few teachers realize that their instructional program is only as effective as their personal commitment and dedication to serving the needs and aspirations of their students. In most areas of education, we use logical sequences for developing expertise. However, when it comes to professionalism, we treat it as something you automatically acquire or, as the student indicated, "you wake up some morning and have it."

Let me assure you this is not the case. Professionalism must be developed over a period of years through constant professional effort. As educators, why can't we get concerned about the sequence of professional development? Where should the professional sequence start? Let me tell you where it should start. It should start back at the secondary level and progress through the colleges and universities. Athletes, singers, actors, educators, doctors, artists, and members of any other field you want to name don't wake up some morning with the expertise needed to be a professional in their field. They all work up, using developmental sequences. If all industrial arts educators, as a team, worked together to develop a professional sequence that started with the students at the secondary level, progressed to the college students, and worked into teacher organizations at the state and national level, we could have 40,000 AIAA members in 10 years instead of the 12,000 we now have.

As educators, our communication has been almost disastrous to a generation calling for commitment.

We need sponsors who are professionally prepared to provide leadership in student activities. Most sponsors do not have the expertise to share authority or to lead through indirect techniques. This kind of expertise is not provided in the present teacher education programs, but should be.

Through professional sequences of professional development, we can organize student power. Education is involved in a revolution. This conflict exists because that communication element between the school and home, "the student," does not take home an accountable report each day. This revolution will not end until educators become more people-oriented. When satisfied customers take home a good report, we won't have to fight for facilities, equipment, or salaries. Let's join our students and make professionalism a relevant part of the educational process.

Political involvement of students has changed their role, both in education and society. They now possess a legal process to share in making important decisions. Why not provide leadership that will help them develop the expertise needed to use these privileges more effectively? Let's provide leadership for professional awareness through a professional sequence. Because of our ignorance, lack of concern, or unwillingness to share the system with our students, we have forced them into collision with some of our most cherished principles and traditions. The fact that the institutional leadership has become more burdened with managerial and public relations functions should concern the individual classroom teacher who should also assume appropriate responsibilities for these functions.

In the past, a youth earned his adulthood by becoming employed, entering the military service, or by getting married. Today we have provided another avenue through political privileges. Let us add still another avenue by permitting him to share in the system through real leadership roles. Let's develop a professional sequence. We have unions in education now because we failed to develop effective professionalism. Some seem to think the professional associations are for promoting self. This is far from being true. It is for improving instruction, and through improving instruction we promote the profession — you and I — all of us. This is why it is so pathetic; only a few professionals carry the load of our entire profession. Why? Because we have not been concerned about teaching people how to become professional. Again, because we give them a degree and certify them to teach, we make the assumption that they will be professional.

Research indicates that individuals who are involved in effective youth development are also very effective in professional leadership. We have not determined which of these attributes came first, but where you have one, you have the other. I am not talking about the so-called professional who pays his dues and participates in one meeting a year. I am talking about the individual who practices professionalism each day. Let's work toward preparing all of our students and teachers to become professionals. Let's develop a professional sequence.

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ACCOUNTABILITY

Accountability—Planning Programming Budgeting Systems

Ivan E. Valentine

The American school system today appears to be in a period of synthesis and redirection relative to program planning and operation in terms of accountability. Traditional methods of program planning and budgeting focus primarily on resource input. PPBS (Planning, Programming, Budgeting Systems) extends this function one step further in order to measure the effects and results of the process; it focuses concurrently on both input (cost) and output benefits. PPBS is not revolutionary – the implementation of its basic concepts are new only in the arrangement and application. Accountability concepts and methodologies relating to planning, programming and budgeting systems involve the following: planning, programming, budgeting, cost benefit analysis, cost utility, results of operation research, systems development, and systems analysis. A major advantage for implementing a PPBS system in the public school systems of America over the traditional budget system lies primarily in its potential for integrating the planning, programming, and the budgeting process. In this context, we may refer to planning as the process of identifying strategies, alternatives, and priorities for reviewing or projecting long-term objectives. Program planning should optimize the mix of resources available to achieve predetermined specific goals and purposes. For the purpose of this paper, budgeting should be viewed as a process of systematically relating and projecting the financial resources required to accomplish projected educational objectives.

PRESENT STATE OF THE ART

At all levels, educators are currently being bombarded with a deluge of new terms which are being directed at personnel in the educational system such as management by objectives, performance contracting, cost benefit analysis, systems approach to problem solving. These are only a few terms which in the context of carrying out a precise task lead to confusion, misunderstanding, and in some cases dissolution. Even though many of the accountability concepts have been implemented by educators, the concepts of PPBS seem complicated to some. These concepts sometimes seem confusing and easily misunderstood because they overlap into both the administrative and the curriculum function in the educational system. PPBS means that planning, programming, and budgeting must be developed with emphasis on systems concept. Attention should, however, be directed toward the word "systems" for each segment – planning, programming, and evaluation. All aspects of PPBS are integrated to form a management tool which supports administrators in accomplishing the task of management by objectives.

Education today is at the pinnacle of confusion, mistrust, and some misgiving about the effectiveness of its assigned mission. A statement made by Daniel Bell, chairman of the committee on the "Year Two Thousand" made the following statement.

> Although action is typical of American style, thought and planning are not; it is considered hearsay to state that some problems are not immediately or easily solvable, that it might take . . . perhaps a generation for real improvement to occur. A sense of historical time is absent from American thought, and a desire for instant "reform," the form of instant "solution," is deeply engrained in American temper. (1;648)

It is quite evident that this comment is pertinent to the American educator as he serves the needs of all concerned with the educational environment. In my judgment, educators in the future will have to provide governors, legislators, boards of education, and citizens with more basic information on what education can do with the financial input. Educational institutions must provide more concrete evidence concerning the school's potential and actual output. Leaders at all levels are no longer content to know, in abstract dollar terms, what constitutes philosophical needs of the school in a particular community. The recent rend in many states is to pass legislation concerned with accountability.

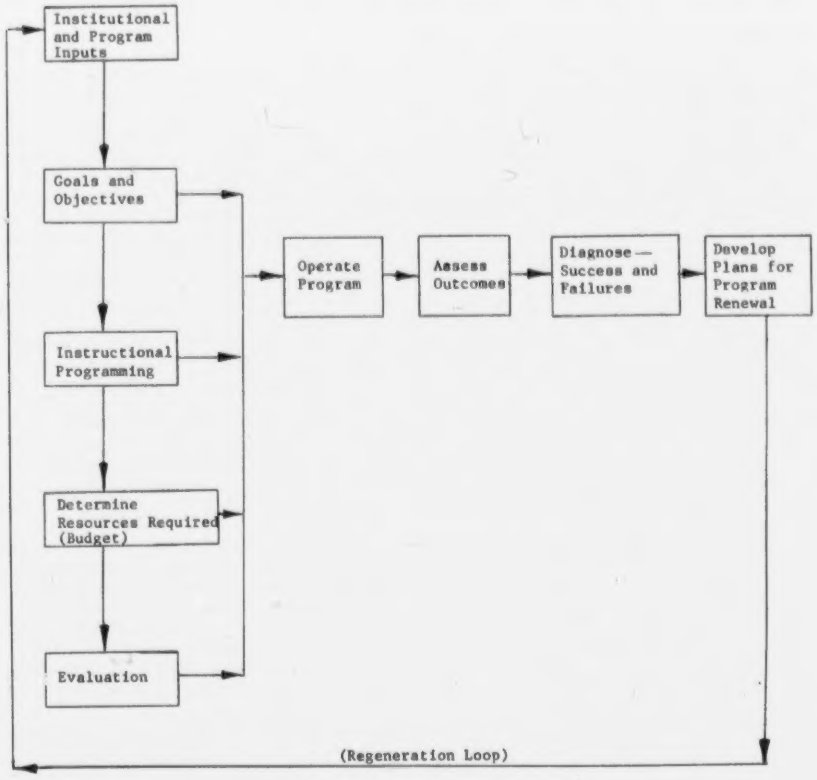
Charles H. Brower, president of Batten, Barton, Durstine and Osborne, Inc., a leading advertising agency, stated sometime ago in a talk before the Sales Executives Club of America the following observation about America:

> Here in America we have reached the high tide of mediocrity, the era of the great goof-off, the age of the half-done job. The land from coast to coast has been enjoying a stampede away from responsibility. It is populated with laundry men who won't iron shirts, with waiters who won't serve, with carpenters who will come around someday maybe, with executives whose mind is on the golf course, with teachers who demand a single salary schedule so that achievement cannot be rewarded, nor poor work punished, with students who take cinch courses because the hard ones make them think, with spiritual delinquents of all kinds who have been triumphantly determined to enjoy what was known until the present crisis as the new leisure.(2)

Schools can no longer function in isolation, nor can they insulate themselves from the community in which they live. Many of our public educational institutions are concerned with teachers who do not teach and with students who will not learn. Basic Elements of PPBS have been advanced, Figure I, as rudimentary elements and form a base from which to design a PPBS for the educational establishment. PPBS and management by the objective system requires the user to identify goals and objectives, instructional programming, determine resources required (budget), and develop an evaluation process. These inputs are necessary and required prior to operating the program. A vital part of any educational planning, programming, and budgeting system is that facet which assesses

FIGURE I

BASIC ELEMENTS OF PPBS


Institutional and Program Inputs
Goals and Objectives
Instructional Programming
Determine Resources Required (Budget)
Evaluation
Operate Program
Assess Outcomes
Diagnose — Success and Failures
Develop Plans for Program Renewal
(Regeneration Loop)

the outcome, and concurrently diagnoses the success and failures of the system. No system is complete unless it develops plans for program renewal, and this important element is indicated in Figure 1. The regeneration loop leads vital information back into the institutional programs and inputs. The basic information contained in the elements of PPBS can further be delineated into the following:

a. Determine the needs of the population to be served.
b. Project long-range goals.
c. Develop objectives of the immediate future.
d. Develop descriptions of learning activities which will be conducted to meet the objectives.
e. Transform program requirements into financial requirements to accomplish the activities.
f. Develop a system for evaluation and longitudinal assessment.
g. Identify alternatives, priorities, and strategies to the present program.

Once these basic elements have been identified and organized into a workable system, then the PPBS plan is implemented as per the predetermined programming activities. One of the spin-offs of PPBS certainly would be to assess the alternatives that are generated as educators evaluate the input and output in terms of projecting next year's program operation. It is essential in any educational endeavor that we systematize a technique for self renewal or regeneration for the organization.

THE BUDGETARY PROCESS

The educational budget may be defined generally as the educational program interpreted in terms of the dollars required to secure the necessary resources, staff, facilities, curriculum, equipment, supplies, and those supplementary services required by an institution to accomplish its given mission. There are three distinct, basic considerations in developing an institutional budget: (1) to provide a detailed educational plan, (2) to develop the proposed spending plan, and (3) to determine the sources of revenue required. Most educators and administrators agree that the budget reflects the objectives of the institution, the philosophy of the community, and the values which society places on the impinging values of education.

There are certain characteristics of the budgetary process that should be understood by the administrators responsible for educational programs and by those responsible for finance and business management in any institution. Administrators are cognizant that appropriations are approved usually for one or two fiscal years. Legally, authorization goes with an appropriation to the governing board or agency responsible for formulating a spending plan for the funds. An essential part of any budget is to determine the amount of funds required to meet educational objectives and to determine administratively how the appropriation will be spent by line item and purpose within the institution. The administrator has the responsibility of initiating policies for consideration by the governing board. These policies may influence the administration of the fiscal and business management tasks, including accountability and procurement of resources to achieve the educational mission.

Specifically, the administrator's responsibility for business management within an institution may be classified as:

(1) Developing a plan for collecting and expending all institutional funds.
(2) Directing the use of the school's assets and serving as the guardian of school indebtedness.
(3) Directing and coordinating the use of the physical plant, including maintenance of the facilities and equipment.
(4) Organizing a plan for maximum utilization of nonclassified (support) personnel required in the educational institution.
(5) Analyzing the business management function in proportion to the larger task of the institution, which is the improvement of the instructional program.
(6) Reviewing the business management function and the fiscal responsibility pertinent to securing the resources and services required to carry out the instructional program.

The management function for fiscal affairs in any educational institution requires the ability to integrate the planning function and programming tasks with a budgeting and accounting system required in the operation of educational institutions. The administrator must formulate fiscal programs which include and have identified alternatives, priorities, and concurrently develop a system for selecting the best alternatives based on realistic priorities. A major responsibility of the administrator (cooperating with the staff, teachers, department heads, special assistants, and business manager) is translating the educational program requirement into a formal budget request. The systems approach for institutional budgeting should be utilized, and the requests therein should be understood by all associated with the institution. An integral part of any educational budget is a statement generalizing the responsibility of the institution and the purpose or mission for these educational services in terms of the organization as it presently exists. The educational budget should be used as a device to evaluate the performance of the institution against the projected or planned performance in terms of effectiveness and the accountability factor. It is important that the educational budget at the end of the fiscal year should provide base data for the governing board, educational administrator, and business manager to make sound educational decisions based on fiscal expenditures and requirements. An equally important aspect of school finance, particularly in occupational education, is to provide pertinent and consistent data (reports) for fiscal and student accountability to the unit of government (local, state, federal agencies) from which the institution derives its financial support. The foregoing agencies require fiscal and program reports as per the rules and regulations. Evaluation and accountability for all funds are responsibilities that can best be met by using PPBS or PPBE.

The educational leader is responsible for all educational programs, be it occupational education, general education, or whatever classification may be desired. There are certain administrative functions that must be understood by the individual as he plans and prepares the institutional budget. Of prime concern to the administrator are the aspects of programming, budgeting, accounting reporting, auditing, and the management operations within the institution. Of equal importance in the institutional management is the responsibility of managing the investments of the institution. These may occur in terms of facilities, equipment, land, endowments, and other private and public monies entrusted to the institution.

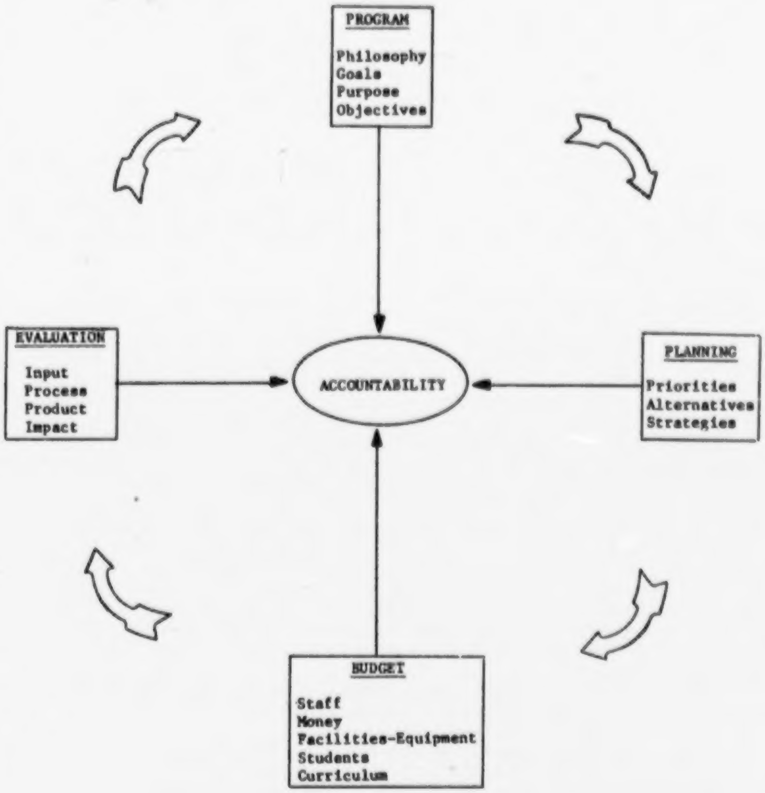
ACCOUNTABILITY

There are many definitions that are acceptable for accountability in the educational sector. But one that is simple and easy to understand may be advanced as "when schools start doing what parents and community thought they were doing all the time." However, a more technical and definable definition is advanced — "the condition or state of being accountable, liable, or responsible. (In schools, this refers to fiscal and student-related responsibilities.)"

The basic concerns for accountability are depicted in Figure II, "Important Elements of PPBE Related to Accountability." The elements advanced for consideration are not exhaustive, but are typical of those found in educational institutions. Accountability is at the heart of the process. Program elements concern philosophy, goals, purpose, and objectives. The planning process delineates priorities, alternatives, and strategies. The budget is developed to identify resources required to conduct the program and includes staff, money, facilities-equipment, student support, and the curricula. The greatest input relative to accountability is evaluation. This element is most important and establishes a qualitative and quantitative process to determine efficiency of program input, process, product, and impact. It is important that educators review in depth some of the constraints which influence or restrict implementation of accountability and elements of planning, programming, budgeting systems into the educational sector. Following is a list of constraints, not in order of importance, but merely to depict some of the major elements that must be reviewed and considered with caution as educators plan around these constraints for administrating the educational institution:

(1) Technological constraints
(2) Policy constraints
(3) Political constraints
(4) Organizational and legal constraints
(5) Financial constraints
(6) Purpose and goal constraints
(7) Population constraints
(8) Image constraints
(9) Personnel constraints
(10) Specialized resource constraints
(11) History and tradition
(12) Organizational constraints
(13) Curriculum — instruction
(14) Time and change constraints
(15) Fear and distrust constraints

IMPORTANT ELEMENTS OF PPBE
RELATED TO ACCOUNTABILITY
FIGURE II


PROGRAM
Philosophy
Goals
Purpose
Objectives
EVALUATION
Input
Process
Product
Impact
ACCOUNTABILITY
PLANNING
Priorities
Alternatives
Strategies
BUDGET
Staff
Money
Facilities-Equipment
Students
Curriculum

Once an administrator has identified these limitations for accountability, he probably is in a better position to further delineate the purpose and function of accountability and PPBS in local schools.

A major aspect in developing PPBS and concurrently the accountability factor is that these systems require expensive narrative information to be utilized by the administrator or educator in coordinating all the parts which contribute to the educational program. In addition, a delineation of purpose, goals, and objectives of the organization must be determined and alternatives must be identified for modifying or reshaping the educational environment. PPBS is student- or output-oriented. The major focus in satisfying the needs for accountability will determine what students learn and how well they have learned. A planning, programming, budgeting system assumes that the program will continue to operate in a somewhat less friendly environment and administration will be forced to budget around scarce financial resources. In the past, many administrators and teachers have taken a purely intellectual approach to education, giving to the public and community what it ought to have rather than what the public really wants and needs. Those responsible for PPBS must be cognizant of the premise that schools do not operate for a profit; therefore, the emphasis of operation must be designed to promote efficiency in the teaching and learning process. These factors mean that educators cooperating with citizen groups, boards of education, and students will need to establish a set of priorities, alternatives, and strategies for utilization or allocation of these scarce funds. Educators will have to determine the student needs and concurrently establish a projected set of benefits that can be measured against potential benefits which might exist in alternate programs. All systems operate on the premise that a base-data or information system is available which includes the present methods of accomplishing potential benefits which might exist in alternate programs. All systems operate on the premise that a base-data or information system is available which includes the present methods of accomplishing goals and objectives and the cost of implementing these methods. Educators must be realistic in measuring validity of the goals and objectives and determine cooperatively with related agencies if they are realistic.

One of the strongest attributes of PPBS as a system to improve quantity and quality of the educational program is that it is people- and student-oriented. It is designed with the idea in mind that the decision-making power and related responsibilities may be more cooperatively shared with those in the hierarchical structure. PPBS will not make decisions. It merely provides a better data base which will result in better decisions by those required to make them.

DEVELOPMENT OF OBJECTIVES

The development of PPBS is based on the premise that the educational organization can develop for itself a set of objectives which can be achieved at all the various levels. In order to coordinate the various levels of objectives within the total instructional program, it might be useful to think of them as being of three types of categories. The three advanced for consideration are learner objectives, program objectives, and organizational objectives. It is fruitless to develop or project objectives in the hierarchical structure unless they are measurable. The purpose of objectives is to indicate the kinds of changes to be brought about in the student so that instructional activities can be planned and developed in a way likely to attain these objectives; that is, to bring about changes in students. Can objectives be achieved that are realistic in terms of accomplishment? An objective may be defined as a "description of a pattern of behavior that the learner should be able to demonstrate: a blueprint for accomplishment." (3;3) There is utter confusion about defining a performance goal or, as some writers prefer, performance objective. In PPBS, these terms may have some meaning – "a performance goal is an educational objective that clearly states measurable and observable performance (with tolerance) that identifies the conditions under which the events or steps involved in learning will take place." (3;3)

In writing performance objectives, the following are four questions that can quickly summarize the completeness of the proposed objective: (4)

a. Who will perform the desired behavior?
b. What is the learner expected to be able to do at the completion of the course?
c. How well is the behavior expected to be performed?
d. Under what circumstances is the learner expected to perform?

No matter how sophisticated we become in education at writing performance objectives, the technique will not be useful unless measurable objectives are used at all levels within the administrative and instructional program. The instructional program's objectives must also be interrelated and coordinated if we wish to insure qualitative and measurable results. Most of the learner objectives previously developed in programming in vocational and general education have centered around general and obscure objectives for the learner. Performance objectives describe and predict the post-instructional attitudes, competency, performance, or ability of learners resulting from their experience in the instructional program.

Equally pertinent are those objectives which guide the staff of the instructional program in their roles as members of the over-all organization. Objectives in this category are predictive and measure the accomplishment of individuals in the organization. This group of objectives we can call organizational objectives. These are generated from the philosophy, purpose, and objectives developed for the organization.

It is important in developing the programming aspects of PPBS that learner objectives, program objectives, and organizational objectives be merged into one single effort relative to evaluating the accountability factor for the program. The most relevant tool for program budgeting and cost effectiveness analysis must rely heavily upon measurable objectives. If we have performance goals or performance objectives at the various levels within the organizational structure and these can be measured for output and accomplishment, then accountability becomes less an issue with the internal and external constraints. A major concern for all educators is the lack of basic research for determining the validity and reliability for the multitude of objectives being utilized nation-wide in education. The generalizability of these objectives is doubtful and could contaminate the results in accountability studies.

MANAGEMENT BY OBJECTIVES

Another important related aspect of PPBS lies in a concept referred to as MBO or Management By Objectives. It is imperative that the administrator utilize these concepts in working with his staff on developing PPBS within the institution. The following steps are advanced relative to implementing management by objectives for personnel within the educational organization.

a. The educational administrator or instructional supervisor will coordinate closely with each individual a mutual agreement and understanding for the position classification, and they agree on the content and the expected perfomance of the assignment and isolate the important major duties and tasks which he will do and identify how he will be held accountable for accomplishing these tasks.

b. Each individual within the organization will develop for himself performance tasks with his immediate superior and will assume the responsibility for accomplishing these predetermined tasks.

c. Each individual within the educational organization should discuss with his immediate superior the performance goals established by the individual and develop plans for evaluation.

d. Benchmarks will be established cooperatively by the superior and the individual to determine points of evaluation and review his progress and concurrently measure the progress at desired points.

e. The superior or the administrator and each member of the organization will identify benchmarks, hold formal conferences, and mutually discuss the accomplishments and the results (qualitatively and quantitatively) of individual efforts that have been made to meet determined objectives.

A review of the responsibility of management by objectives for personnel in the educational establishment indicates it is important that this technique be an integral part of PPBS. Educational leadership cannot develop a program planning budget system and isolate any segment of that organization from the total effort. Administrators must program and devise a method to evaluate inputs, processes, and determine the impact. It is only with this approach to improving the total program planning and budgeting process that an organization will fulfill its responsibilities in terms of accountability, both fiscally and to the students and external populations that they serve. MBO and PPBS both have direct implication on the complexity of the organization. Educational organizations generally have been quite complex and difficult to administer. The utilization of a systems approach (MBO - PPBS) will require in many cases a process to simplify the organizational structure. The following are some elements which will tend to shorten the span of control and improve the communication process:

a. The organization must have specific objectives and facilitate efficiency in terms of utilizing total resources.
b. The operation must be democratic and planned for freedom of performance of human resources therein.
c. The organization must be designed to be flexible in a changing environment.
d. The design should be usable in the complex non-friendly environment, free of duplication and waste of scarce resources.
e. The organization must have a built-in mechanism for self-renewal or regeneration.

Educators at all levels realize that to reorganize the instructional program is a large task and cannot be accomplished in a plan of isolation from the general public.

CONCERNS FOR PPBS

It is only appropriate that educators delineate the major function of PPBS and identify what it will do for those responsible for directing the activities of an educational establishment. Following are a few of the strengths and assistance that can be derived from such a system:

(1) It reinforces and enhances the decision-making process.
(2) It assures the decision maker a variety of choices for valid comparable alternatives.
(3) It strengthens the time dimension, in that it relates today's decision and depicts the implication in long-range consequences of planning.
(4) It takes into account all costs that are inherent in the decision-making process.
(5) It develops a process to implement change by providing continuous analysis of goals, objectives, and programs.
(6) It provides the administrator with base data on almost all subjects or issues in the organization and in a way that is useful to the decision-making process. (5;33)

The foregoing statements are not meant to be an exhaustive list, but merely indicate what PPBS can do for the administrator in utilizing a systems approach to improving the over-all operation of the educational establishment.

As one analyzes the purpose and effectiveness of PPBS, it is only fair to delineate some of those constraints and identify certain elements where it will not be effective. The following are but few of the concerns which one must consider as educators develop a PPBS system and accountability for an organization:

(1) It is not revolutionary — its principles are really not new. The exception is that their arrangement, utilization, and use are different.
(2) PPBS is not a substitute for sound judgment, wisdom, opinion, experience, and sound decision-making.
(3) Educators should not think of PPBS as a device to computerize or mechanize the decision-making process.
(4) It is not a gimmick or a technique to save money or to cut expenditures.
(5) It is not just another line-item budget.
(6) Currently PPBS is not the answer to solving all problems at all levels in all settings.
(7) It will not replace the human decision-making process. (5;34)

PPBS is a mechanism by which educators can improve the quantitative and qualitative aspects of educational programming. The administrator of the future, if not voluntarily, will be forced by legislation to account for not only the organization and the people therein, but to measure quantitatively and qualitatively the products. Program planning and budgeting systems of the future will further delineate and describe objectives in terms that are acceptable by those responsible for financing the system.

The following definition is advanced as typical of those that may be utilized in conveying to the general public how educators will account for their actions and how well they accept their responsibilities in terms of accountability. Accountability may be defined as the condition or state of being accountable, liable, or responsible. In the educational establishment, this refers to fiscal- and student-related responsibilities. Of equal importance in terms of common understanding in a PPBS system is that we delineate and define what we mean by input, process, product, and impact. The following definitions may serve as a guide to administrators as they define these terms:

a. Input — the resources required to accomplish purpose goals and objectives
b. Process — how we plan, develop, and conduct the instructional program as part of a delivery system
c. Product — graduates, result of our total effort, in quantitative and qualitative terms
d. Impact — analysis of the results in terms of the power to produce change (social, civic, economic, political, etc.).

The aforementioned terms have been given to help clarify the elements that educators will be held responsible for in terms of accountability for planning, programming, and budgeting within the educational establishment. The administrator and others within the institution should have a thorough understanding of the following definitions as they develop programming for the educational process:

a. Objective – a description of a pattern of behavior that the learner should be able to demonstrate; a blueprint
b. Performance goal – an educational objective that clearly states measurable and observable performance (with tolerance) that identifies the conditions under which the events or steps involved in learning will take place. (Op Cit.; 3)

It should be the responsibility of any educational establishment to delineate its terms and advance definitions which are acceptable and understandable by the internal and external populations.

EDUCATIONAL SYSTEMS

Another necessary element in implementing a PPBS and the accountability function within the educational organization is to understand the technique for designing educational systems. For the purpose of this paper, an appropriate definition for "educational systems" which seems to be simple enough to implement and yet understand in most educational settings is – an educational system is designed to collect, compile, and systematically program data from several sub-systems and is organized into one major system to facilitate data processing required for accounting, auditing, planning, management control, evaluation, and operation control for the organization. Administrators cannot isolate or subdivide PPBS, MBO, accountability, and systems approach, but they must think of these administrative techniques as being a part of a whole, or having at least implications for the total process. One cannot isolate one segment from the other two and maintain principles of PPBS and accountability. There are many different kinds of systems. The major function of systems in education basically is to provide assistance in four major areas of the decision maker: policy formation, management function, the instructional program, and research and development activities (cost-benefit analysis).

PPBS is a system within itself, and we look at a "systems approach" in terms of sub-systems or tracing flow of activities and identifying responsibilities.

There are many limitations to systems and system analysis which relate and are pertinent to accountability. It would be foolhardy to develop a program for PPBS and accountability if the administration was not cognizant of the limitations and restrictions that must be considered when they evaluate the effectiveness of any plan. Hartley (6;519) has identified 25 major limitations of a systems analysis in education. They are as follows:

(1) Confusion over terminology
(2) Problems in adapting models
(3) A wisdom lag
(4) Illusion of adequacy by model builders
(5) Inadequate impetus from states
(6) Centralizing bias
(7) Unanticipated cost increase
(8) Goal distortion
(9) Measuring the unmeasurable
(10) The cult of testing
(11) The cult of efficiency
(12) Spread of institutional racism
(13) Political barriers
(14) Conventional collective negotiation procedures
(15) Lack of orderliness for data processing
(16) Monumental computer errors
(17) Shortage of trained personnel
(18) Invasion of individual privacies
(19) Organizational strains
(20) Resistance to planned change
(21) Antiquated legislation
(22) Doomed to success
(23) Defects and analysis
(24) Exhilarating social change rate.

Analysis of the above limitations reveals that administrators must proceed with caution as they develop PPBS as the sole device for determining a quality education program.

SUMMARY

As in research, the contamination factors in planning, programming, budgeting systems is an element that must be controlled if they are to be effective. The future of planning, programming, budgeting systems will depend primarily on the ability of administrators to coordinate the activities of everyone within the organization; to develop purposes, goals, and objectives which can be achieved and which satisfy the accountability factor in the private and public sector. In the final analysis, administrators must have the ability to identify realistic problems and isolate imaginary ones as they direct the activities of others in achieving accountability for students and to parents who are demanding so much from the educational establishment.

In the final analysis, it is an awesome responsibility for the school administrator to make programs and budgets compatible due to inflationary costs and still provide a realistic and dynamic educational program compatible with the revenue available from all sources. However, the demand for fiscal and student accountability places the public institutions in our society today in a position necessitating developing better budgeting procedures. Educational institutions need to improve the system for accounting and reporting that will provide a data base from which to evaluate the effectiveness of the institution and simultaneously provide policy makers with the data for decision-making. The fiscal management in any institution is based primarily on planning, management, auditing, and the operational control required in the conduct of the fiscal affairs of the institution.

There are many different ways to finance public education. The source of funds for operating general and occupational education varies from state to state. The principles and practices for budgeting and for the management function within the institution are basically the same, regardless of the source of funds. The key to successful fiscal management is based on sound practices for accounting and reporting the expenditures within the institution. Administrators have to account for funds expended due to federal and state participation within the program; however, this usually presents little or no problem due to the rules and regulations governing the expenditures of these funds. In the final analysis, the success of any institution will depend upon its efficiency in terms of operation based on cost-benefit analysis. Efficiency can best be accomplished within the system if administrators have a plan of operation that is derived from effective communications, self-assessment, and human relations in the conduct of the fiscal affairs for the institution. A scarcity of resources and public and political attitudes toward all education place the educational institution in an environment that is demanding more and better education with limited resources.

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AEROSPACE

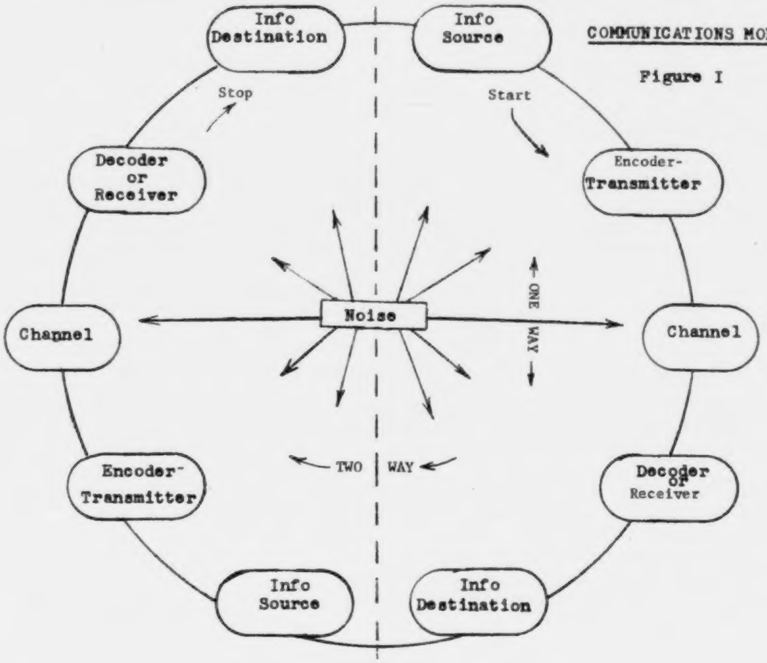
Tele-Communications in Space Technology

William E. Dugger, Jr.

Communications is the process of giving and receiving information. The word communication comes from the Latin word "con-munio" which means to impart, pass along, transmit, or make known.

Man has always been a communicator; beginning with the earliest caveman, he developed systems to communicate. Down through the centuries, the distances over which men communicate have been increasing. This is especially true in the space age.

A model for the communications process is shown in Figure I. Notice that one-way or two-way communications is shown.


Info Destination
Info Source
Stop
Start
Decoder or Receiver
Encoder-Transmitter
Noise
ONE WAY
Channel
Channel
Encoder-Transmitter
TWO WAY
Decoder or Receiver
Info Source
Info Destination

COMMUNICATIONS MODEL

Figure I

INFORMATION SOURCES FOR SPACE COMMUNICATIONS

The source or origin of the data or information is the beginning of any communications process. In space communications, information can originate in instruments or man. Some examples of information sources and the class of phenomena they deal with are:

Data Communication

Typical Instruments	Class of Phenomena
Geiger counters, magnetometers, plasma probes, ionization chambers	Fields and particles

Pressure gauges, thermometers, air-glow photometers	Planetary atmospheres
X-ray photometers, ultraviolet spectrometers	Solar physics
Telescopes (optical and radio wavelengths), gamma-ray detectors	Space astronomy
Cameras, surface samplers, soil composition experiments	Planetology
Cameras, infrared radiometers	Meteorology
Astronaut electrocardiographs, life detectors	Bioscience

Human Communication

Video
Audio

ENCODERS & TRANSMITTERS

Many of the instruments just listed are inherently digital; that is, they count events and other discrete phenomena. For example, the number of Geiger counter discharges per second is an integer; the output of this experiment is already digitized. Housekeeping instruments that indicate switch positions are already digitized, because on and off modes can be described as 1's and 0's. Commands to spacecraft are normally digitized. First, a command must contain an address that picks out the desired satellite from the hundreds in orbit. The address will also have to select the specific part of the satellite that is being commanded. A command's address is similar to a telephone number; and it is digital. The second part of a command gives the order to the addressed piece of equipment. The order might be "turn yourself off" or "read out the tape recorder." These are switching commands that are inherently digital. Other spacecraft instruments generate analog or continuously varying data.

Before the data from the various spacecraft instruments can be sent to Earth, they have to be organized into a pattern that terrestrial data-processing equipment can recognize. As the spacecraft communication equipment scans all the instruments, it assembles the readings into a data frame, which is somewhat like the system used in modern telephone modulation systems. A number of conversations are carried over the same carrier at once (see Figure 2). The different telephone conversations represent various data to be transmitted.

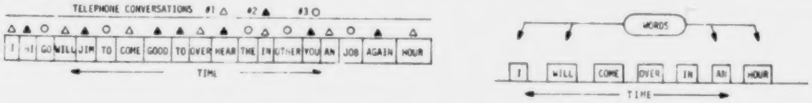


FIGURE 2

Three multiplexed telephone conversations.

Not all space data are so rigidly and thoroughly mechanized. The voice link connecting astronauts with the Earth-based mission controller will usually be analog; that is, the amplitude and pitch of the astronauts' voices will be represented by a continuously varying signal. Television pictures from NASA's weather satellites and planetary probes are often digitized, although they may also be analog in character, like home TV.

CHANNELS FOR COMMUNICATIONS

The majority of channels for space communications involve electromagnetic waves from 100 to 10,000 megahertz (primarily 136-137 MHZ). The laser also has had some limited use as a communications tool in space. The major problem with laser communications, however, is loss of signal strength caused by distance and aiming problems of the light beam from transmitter to receiver.

RECEIVERS AND DECODERS

Receiving antennas and tracking equipment detect the faint space communications signals. The signals are then tuned and amplified. Information is fed into computers or processed for human consumption (audio or video).

INFORMATION DESTINATION

In space communications, the information destination can be man or machine. The men at the Mission Operations Control Room as well as thousands of other scientists monitor communications from space. Much of the data is fed into earth-based computers for translation or storage.

Also, much information is provided to the world through NASA publications, films, educational programs, and public affairs data.

NOISE

Noise is anything that tends to interrupt the communications process. Basically noise in space communications can originate from the following sources:

Terrestrial Noise (earth-based)
Atmospheric Noise (lightning and other electrical activity)
Cosmic Noise (space noise from other planets)
Solar Noise (sun spot interference)

Noise is primarily a problem in the communications channel; however, it can interrupt the signal at any part of the communications process.

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Rationale, Programs, and Resources for the Study of Space Technology

Arvid W. Van Dyke

The rationale for the study of space technology could be written around many points of view. There are documents which approach the study from each of these general angles.

1. The integration of material-process information into traditional subjects.
2. The inclusion of aerospace-aviation into power and transportation concepts.
3. The stimulation of research and development activities as found in research laboratories.
4. The study of space technology as content of a technological world to which the student must adapt.
5. The student applying space age technology to problems in the real world.

The final viewpoint has attracted the attention of the curriculum development project funded by the National Aeronautics and Space Administration (NASA) in three Virginia colleges. Virginia State College, in cooperation with Virginia Polytechnic Institute and State University and Norfolk State College, has involved students and faculty in the preparation of curricular materials. A rationale does not come to someone in a single moment nor through a single discussion with a single individual. Each thought has come through a continual interaction with those who would seek to contribute or seek to criticize. The project has had the freedom of the research grant to evolve from one rather narrowly-defined approach to a broad "student applying technology" rationale that should satisfactorily focus the research.

The topic of this speech breaks conveniently into construction-manufacturing solutions, communication solutions, power and transportation solutions. The educational benefits of space age technology require that a rationale for the study be prepared before dealing with space age technology that can be used in teaching.

RATIONALE: STUDENTS APPLYING SPACE TECHNOLOGY

The study of technology must allow the student to apply the benefits of space technology to the real world. Some say this experience will be useful to him as a future citizen, while others propose that he use the technology in his daily industrial arts experience. The student's need is the base. He selects. He charts directions. He moves with his activity into the mainstream of life.

APPROACH: STUDY OF SPACE TECHNOLOGY CONTENT

This content-oriented approach is in contrast to the rationale, which is student-oriented. The content of the study leads to activity which acquaints students with the technological culture, the content and divisions of that technology, and the place he may fit in order to cope with it. He does not mold the technology to solutions; he looks for solutions as one uses a Sears catalog. He selects content from that which is available to him. The benefits of space technology are important to his life and in fact improve his life—therefore improving the society in which he lives. The student, however, misses the challenge of discovery and application to a problem that is real to him in his community or his world.

CONTENT: TECHNOLOGICAL CONTENT FROM SPACE PROGRAM

Space-derived technology is content for study in industrial arts. New systems of communication become units of instruction in electronics course outlines. The study of these systems is an educational benefit, since it provides new information that can be learned. Sputnik shocked America into educational reorientation. New techniques of organizing content began to emerge in most disciplines. Industrial arts found itself with narrow subjects which were broadened by reformers who finally saw technology a topic of study. The computer should become a topic of study and understanding. Few people in this space age are untouched by a computer card.

Management systems have brought the nation's human resources together in project teams to explore space. Such activity can be simulated in our laboratories with the same need and use of seminar and progress sessions, the same technically-written contracts, and the same mission completion in "A-OK" fashion.

INSTRUCTIONAL TECHNOLOGY: USING SPACE AGE TECHNOLOGY IN EDUCATION

International live television via satellite for education is now routine. Remote areas of the United States can be reached, so that viewer may learn in his home. Simulators were developed in the space program for training purposes and can now be used to prepare drivers and teach via contrived experiences. Satellites acquire, store, and dump data into classrooms where the student can research and survey conditions by computer-assisted retrieval.

EDUCATIONAL PROGRAMS: PROVIDING FOR THE STUDY OF SPACE TECHNOLOGY

The apprenticeship programs of NASA provide training in the vast expanse of careers the space program has delivered. Work-study experiences are offered to the non-employee who may obtain high school, college, or certification credit. Industrial arts is becoming involved in these experiences for students and teachers. Space mobiles travel to schools and communities with lecture, film, and model capability. Publications present the content in new yet comprehensive ways.

CURRICULUM DEVELOPMENT

The research grant provided by NASA has provided a program wherein industrial arts can plan hands-on activity. The Unit, Group, and Research methods are being employed as vehicles for the study. Pilot teachers will field-test the materials, and NASA personnel will be in schools consulting with the industrial arts students. Grants provided by NASA make contemporary experiences in space age technology available to students who may apply technology to urban problems.

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CAREER EDUCATION

The Role of Industrial Arts in Career Education

Neil E. Ballard

The term "career education" as it will be used here describes a new educational thrust that offers prospects for the redirection of our present educational system around a career education theme. This new thrust may provide the catalyst in which our fragmented educational system may be pulled together around one central theme.

EFFORTS IN TEXAS

In an attempt to better illustrate what is meant by career education, I will describe the activities and model developed by the Texas Education Agency, Austin, Texas. State-level activity started in the spring of 1970 when a multidisciplinary task force, representing all educational disciplines (including representatives from general education, special education, and occupational education), developed a leadership bulletin entitled A Tentative Framework for Developing Comprehensive K-12 Career Education.

This tentative document is intended to provide the school districts with ideas for implementing career education locally. The characteristics, objectives, and levels of career education suggested in this bulletin will be given here to describe what is meant by career education.

DESIRED CHARACTERISTICS OF CAREER EDUCATION

1. It should consist of coordinated, sequential, and cumulative activities, K-12.
2. It should be multidisciplinary in nature. It should utilize as far as possible the existing educational disciplines, with emphasis upon goals of students.
3. It should have meaning to the student, the school, and the entire community. The community should be interested, supportive, and involved.
4. It should ensure that students develop a positive attitude toward work and that they respect each person's work through understanding of the interrelatedness and interdependence of all careers.
5. It should provide an awareness of and an adaptability for differences in demands in the labor market and the career world.
6. It should offer students alternate sequences through a flexible educational system that can adjust to the interests, aptitudes, abilities, aspirations, and unique characteristics of each individual.
7. It should contribute to students' knowledge of the fundamental concepts and processes of the American economic system and of opportunities for individual participation and success in the system.
8. It should ensure that all students are prepared to enter the world of work with marketable skills.

OBJECTIVES OF CAREER EDUCATION

Awareness

By the end of the elementary school years, students should:

- Demonstrate wholesome attitudes toward the career choices of people; toward work as a means of achieving many satisfactions; and toward work in relation to themselves.
- Demonstrate an understanding of the life styles, values, major duties, and responsibilities involved in a large number of careers.
- Demonstrate their ability to apply basic economic concepts to problems which can be understood by children of their age and experience level.
- Show interest in exploring many careers.
- Know how to obtain additional information about careers.

Investigation

At the end of their middle or junior high school experiences, students should:

- Have in-depth knowledge of several major career fields.
- Have become aware of many additional career fields.

- Have explored rather thoroughly their own values, interests, and educational achievements.
- Have first-hand acquaintance with the economic system—as consumers and as observers of those who work to produce goods and perform services.
- Be prepared to select a tentative high school educational plan best suited to their individual needs and desires.

Choice

As a basis for career preparation, each student should:

- Be able to integrate his knowledge of himself and of the world of work in order to identify a career or careers for which he will prepare.
- Recognize the changing nature of career commitment throughout an individual's lifetime and be able to re-evaluate his career choices with the possibility of making further choices later.

Preparation

In addition to continuing the objectives of previous levels, students should be able to:

- Become gainfully employed at an entry level appropriate to their career objectives upon leaving high school or
- Enter a junior college, technical institute, preparatory school, apprenticeship program, or senior college for continued career preparation or
- Both.

The most unique facet of the evolving career education system in Texas is the needs assessment program. The program for needs assessment in career education got under way in the summer of 1972, after the framework bulletin was published. The purpose for such an effort was the need to verify many of the assumptions made in the framework bulletin. To assist in this effort, the Texas Education Agency is funding the Partners in Career Education Project, a consortium of the Dallas and Fort Worth Independent School Districts and Regions X and XI Education Service Centers. The Texas Education Agency and Partners in Career Education are attempting, through needs assessment procedures, to describe the desired learner characteristics of a seventeen-year-old in relation to the career concepts to which he has been exposed before he leaves high school.

To date, the project, through extensive bibliographical research and numerous workshops, has developed about 350 unverified learner characteristics.

During the spring of 1973, these learner characteristics will be validated across the state by groups including students, educators, parents, and business and industrial people.

With these verified learner characteristics as a base, testing companies will be approached during the summer of 1973 to develop instruments for use in a statewide needs assessment during the winter of 1974. These procedures are expected to provide the educational planners at the Texas Education Agency with the data base so necessary for intelligent planning of programs for career education.

In addition to the framework document, the Texas Education Agency has under development curriculum bulletins for elementary and middle school career education. These documents are based on the framework bulletin and are being designed to provide leadership in career education for the local education agencies.

Another unique feature of career education in Texas is the way it is managed at the Texas Education Agency. The responsibility for the coordination of career education at the Agency is in the Interdepartmental Guidance Council, a group consisting mainly of those assistant and associate commissioners who have instructional programs under their control. The chairman of this group is the assistant commissioner for regional education services. He is responsible for coordination of the work of the 20 education service centers throughout the state.

A coordinator of career education works directly under the assistant commissioner for regional education services. Thus, the responsibility for the coordination of career education is neutral ground, so to speak. It is in neither general education nor occupational education.

IMPLICATIONS FOR INDUSTRIAL ARTS

The objectives of career education are not new to the industrial arts educator. Objectives of this type have been in our literature for years. The only problem is that there

CAREER INFORMATION SYSTEM MODEL
GRADES K-12

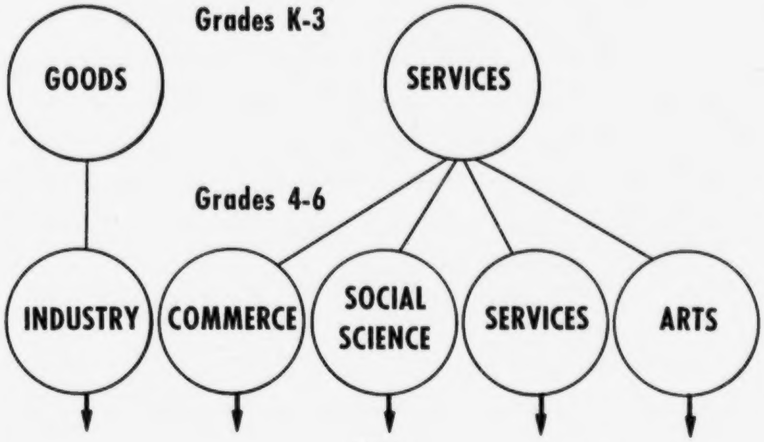
Grades K-3
GOODS
SERVICES
Grades 4-6
INDUSTRY
COMMERCE
SOCIAL SCIENCE
SERVICES
ARTS

Figure 1

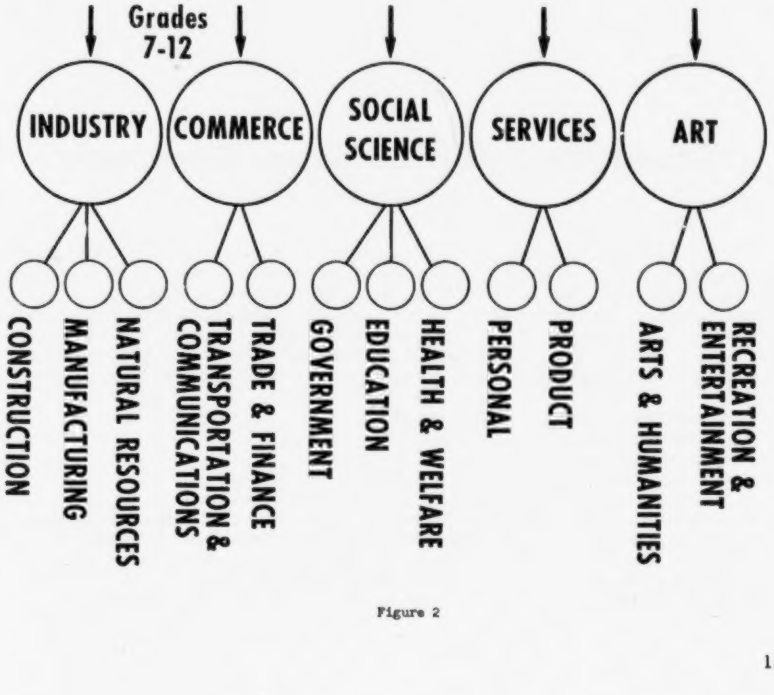
Grades 7-12
INDUSTRY
COMMERCE
SOCIAL SCIENCE
SERVICES
ART
CONSTRUCTION
MANUFACTURING
NATURAL RESOURCES
TRANSPORTATION & COMMUNICATIONS
TRADE & FINANCE
GOVERNMENT
EDUCATION
HEALTH & WELFARE
PERSONAL
PRODUCT
ARTS & HUMANITIES
RECREATION & ENTERTAINMENT

Figure 2

is very often a large discrepancy between theory and practice in the classroom. If we, as industrial arts educators, support the objectives of career education, it seems only appropriate that we get educational practice consistent with our objectives.

A typical way of organizing the many jobs in the world of work is by clustering them into fields such as manufacturing, and various clustering patterns have evolved in the last few years. A popular pattern is the 15 occupational clusters throughout K-12 suggested by the United States Office of Education. However, a recent study by the Center for Vocational and Technical Education, Ohio State University, suggests two large clusters for K-3 which are split into five clusters for 4-6, and further split into 12 clusters for 7-12. The latter pattern is shown in Figures 1 and 2.

The industry cluster split out from the goods cluster, as well as the services cluster, offers many opportunities for industrial arts from kindergarten through the twelfth grade.

Moreover, if industrial arts is to make a maximum contribution to career education, the profession needs to:

- Evaluate presently-accepted industrial arts goals and objectives in relation to those of career education
- Evaluate the present instructional program for consistency with stated goals and objectives
- Develop and test instructional models (based on Figures 1 and 2) in the areas below:

Communications	7 - 12
Transportation	7 - 12
Construction	10 - 12
Manufacturing	10 - 12
Goods	K - 3
Services	3 - 6

There is no doubt that industrial arts has a philosophy, goals, and objectives that are highly supportive of career education. The industrial arts teacher, being an industrially-oriented generalist, is in a unique position to provide leadership to the career education thrust. The success or failure of career education in the schools of this country will in part be the responsibility of the industrial arts educator.

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Current Emphasis on Career Awareness

Leon T. Harney

Career awareness has many aspects, and most of them have been bandied about considerably in recent years. It is now time to get off dead center and go to work with concrete ideas as to the implementation of career awareness in the classroom. The major concern for career awareness is in grades K through six. Hoyt, Evans, Mackin and Mangum have advocated that the early childhood period and elementary school should seek a more balanced view of work and its relationship to life. They make the following promulgations and assumptions about career education at these early educational levels.

1. At least some people must work if society is to survive.
2. All work needed by society is honorable.
3. Any worker who performs such work well is honorable.
4. Work that is enjoyed by some people is disliked by other people.
5. No one has the right to impose his work likes and dislikes on others.
6. A career is built from a succession of jobs which tend to lead each individual from those jobs which are personally less satisfying toward those which bring more satisfaction.
7. Generally those workers who are trained, experienced, and productive find their work satisfying, and they will always be more in demand than their opposites.
8. Almost everything the school teaches can be helpful in at least one type of career.

9. Going through school with no consideration of the type of careers in which one might be interested causes one to miss much of the value in school.
10. Postponing consideration of personal career plans until one is out of school virtually guarantees that the individual will begin work with no training and no experience and will be nonproductive, even in an "unskilled" job.
11. The work ethic should be taught to and accepted by all students.
12. All students should make a tentative career choice by the end of kindergarten and should modify or reaffirm this choice periodically throughout the school years.[1]

The teacher is the main implementer of all career education for early childhood and elementary grades. A great many ideas have been tried with children from the third grade to the sixth, but few have been implemented below the third grade. Earlier this year I started some experiments with children in a pre-kindergarten human development laboratory at East Texas State University and for a couple of years have worked with public school groups from kindergarten through the sixth grade. It has been my observation that the main link in the process of implementing career awareness is the weakest, namely, the classroom teacher. They are not now ready to talk and teach about careers. I have found some who are excellent students in class and have fantastic ideas about what their children can accomplish in their particular classroom who have a most frustrating time trying to implement concrete experiences.

Career awareness is not something new or even unique, for Bonser and Mossman were advocating many of the same ideas for the elementary curriculum in the middle 1920's. The elementary curriculum is still burdened with the same amount and we might even say more basic concepts to transmit to young minds than were the responsibilities of the teachers in the twenties.

How do we implement career awareness? It must be integrated and correlated with the current elementary curriculum. This idea has other significant contributions to make, in that the teacher can concretize abstract concepts and give meaning through the use of practical examples drawn from life experiences of members of the industrial community. You might ask what are examples of this idea.

1. Teacher-made slide-tape presentations showing local job opportunities in home-town industries.
2. Field trips by children to local business and industry.
3. Interviews with people that they admire in industry and report to classmates.
4. Integrate into and correlate with the curriculum by developing writing skills, the ability to meet people and interview them to obtain basic skills in oral communications, develop skill in research presentation to the other members of the class, develop skill in photography.
5. Involve the team role; bring parents to school, ask members of the business community to talk about their businesses and have professional careers discussed by professionals in the classroom.
6. Activities associated with student interest in clubs, in Junior Achievement, where an actual company is formed and a product produced and sold.

There must be as many hands-on activities as can be made effective to illustrate actual job characteristics. Industry and the business community and its representatives have many visual aids and materials available that can be used in the elementary schools to aid in career awareness. For example, let us use the leather industry as a representative. This industry is one of man's oldest and one which is still making advances and changes today. The careers associated with the leather industry vary greatly and cover the complete continuum from professional to the unskilled. The leather industry combines an ancient craft

The classroom teacher working with a group of children using materials from the leather kit.

with modern science. We find that a good number of films, film strips, and booklets and facts are available from the leather industry. The industry has for several years supported research projects and new materials for helping the elementary teacher to provide hands-on experiences. One of the best is a home tanning kit. The industry also helps by providing monthly and bimonthly periodicals on uses and new ideas about leather. In my opinion, the industry is quite willing to help in this venture and merely needs the advice of educators as to the kind and direction this help should go.

FOOTNOTE

(1) Kenneth B. Hoyt, Rupert N. Evans, Edward F. Mackin, Garth L. Mangum, Career Education, Salt Lake City, Utah; Olympus Publishing Company, 1972, pp. 73-74.

Dr. Harney is associate Professor of Industry and Technology, East Texas State University, Commerce, Texas.

Industrial Arts and Career Education in the Middle School

James E. Hanks

The purpose of my presentation today is not to sell you on the middle school system or the careers program, because I would be the first to admit that there are many problems in both programs that need to be solved. Neither am I here to tell you, who are teachers and educators, how to teach and educate, because from personal experience, nothing turns one off more quickly.

To sum it up, there are three things that I shall try to do today. (1) I will explain to you the middle school concept and how it differs from the traditional junior high program. (2) I will tell you about career education, industrial arts' part in the program, and some specific examples of things I am doing in the program. (3) I will give you some points that we as industrial arts teachers must be careful to study in these new programs.

THE MIDDLE SCHOOL CONCEPT

Why the Middle School?

It would seem impossible to conceive of a program well-suited for pre- and early adolescents without taking into consideration the nature of the learners who fall into this category. Any individual is more than a sum of his characteristics; he is a product of the interaction of these characteristics with one another and with the environment. For purposes of discussion, however, these characteristics can be separated into three distinct groups — physical, intellectual, and psycho-social.

Physical Development

During the years of transition, youngsters experience a growth spurt. For some youngsters, the acceleration begins at about the age of 10; for others, as late as age 14. For most youngsters, the rapid rate of physical growth occurs at some time between the years from 10 to 14.

The pituitary gland increases production of two hormones during transescence. One hormone stimulates the over-all growth of bones and tissues; a second influences sexual development and is responsible for the appearance of the secondary sexual characteristics — broadening of boys' shoulders, changes of voice, growth of the beard, and the change of a girl's figure from a child-like form to a more womanly and curvacious figure.

A fluctuation in basal metabolism may cause youngsters to be extremely restless at some times and listless at others. Attention span may appear to be much shorter than that of younger children or of the full-fledged adolescent.

This rapidly growing and changing body is difficult for the transescent to manage. He is awkward, gawky, and clumsy. Physical changes are the most obvious of the alterations the transescent experiences, but they are not necessarily the most important. They do, however, have a profound influence on the other facets of development.

Intellectual Development

During the years of transition, the child begins to lose some of his dependence on what is viewed as reality and to focus on what is potential reality. He can tell us, for example, that the symbols "1, 2, 3, and 4" will probably be followed by "5, 6, 7, and 8." At first he still focuses, however, on the immediate present — the concrete. He will begin to develop the ability to deal with abstract concepts — both the real and the possible. He will consider the problem at hand by attempting to envision all possible relations. The next step is seeking, through experimentation and analysis, to test hypotheses — discarding those not verified by his results. He then forms further hypotheses to be tested.

Youngsters at this level are beginning to be able to reverse their thinking not only to proceed from start to finish in a mental sequence, but to be able to return to the starting point in the sequence. He can, for example, multiply 5 x 5 and get 25, and he can discover that the square root of 25 is 5. In social studies, he can recognize that a sequence of events will lead to a particular consequence, and he can begin to see that a change in one of the events might have prevented the consequence.

The youngster can begin to reason that two objects may possess similar properties regardless of their appearance — they begin to conserve. In its early phases, this is mental conservation of mass — a ball of clay may be shaped into a cube and still contain the same amount of clay. Conservation of weight is a higher mental process and comes later in this stage of development.

Psycho-Social Development

Changes in the self-concept occur slowly and gradually. During early childhood, the home and the neighborhood (and what he sees on television) are most of his world. When he enters school, this world broadens. As he moves into the transition period, he begins to see himself and his world in a different light. Physical and intellectual changes complicate this development. He finds that he no longer fits into a neat category. He is no longer a child, and he certainly is not an adult. Neither is he a full-fledged adolescent. He fits nowhere. At times, his behavior is childlike; at others, it is more like that of the adolescent or the adult.

Parents and other adults are no longer as important as they once were. Teachers, who were formerly viewed as authorities, begin to have some faults. These youngsters can differentiate the qualities of teachers they admire and those they dislike. Fairness of treatment by adults is of prime importance.

Sex-role identification, which was of great importance during his early years, is once more important — especially for the male. Boys seek adult models to exemplify. For many, however, there is no male model in the home after whom they can pattern their behavior. These youngsters must find some model outside the home environment — a teacher, scout leader, an older boy in the neighborhood, or a television or movie star. For girls, sex-role identification is not as difficult. They have helped their mothers in the kitchen, played "house," and have had female teachers. Experience with both male and female models during these years is important for both boys and girls. It gives them a basis for comparison and an opportunity to contrast the behavior of the adult male with that of the female.

With the search for the sex role and the rejection of adult influence (at least to the degree it was once accepted), the peer group begins to be viewed in a different light. Both sexes are keenly aware of sex differences. Males expess a much more negative attitude toward females than do the girls toward them. Close friends are usually of the same sex. The peer group offers security, in that the youngster can do what everyone else is doing. He may even be willing to suffer punishment from the teacher in order to retain his position in the peer group. To be different is to be doomed!

This age group can also be characterized by a keen sense of justice. Not only are these youngsters concerned with fair treatment of themselves and their peers, but of mankind in general. They are likely to expend great energy on causes from which they will derive nothing except the satisfaction of having helped someone who needed their aid.

The transescent may, at times, appear to undergo complete personality changes.

At one meeting he may seem hurt, sad, jealous, or competitive; at the next, worried, cheerful, affectionate, or timid. He angers more quickly and more easily than does the younger child, and it usually takes him longer to recuperate from emotional outbursts.

Difficulty in learning to cope with his changing body, a new mode of intellectual functioning, and the desire to be a person in his own right and to be a person accepted by the peer group present a tremendous problem of adjustment for the transescent. During no other period of human growth and development is he required to adjust to so many changes simultaneously.

CAREER EDUCATION: INDUSTRIAL ARTS' PART IN THE PROGRAM

Career education is difficult if not impossible to fully explain — the U.S. Department of Education has simply designed a program and refused to define it. The reason, the department says, is that it may limit the effective potential of the program if a premature definition is given. With this thought in mind, it is difficult for parents and some educators to really accept the career program when it can't be defined.

Career education is not supposed to be, in any form, vocational education, yet on its higher levels it cannot possibly be anything else but vocational education. On the lower levels and middle school level, it is purely exploratory general education, and industrial arts has a vital role on these lower and middle school levels in the development of the career curriculum.

Career education can be summarized as being many different things to many different people, but to me personally, being in the middle school program, career education is a part of general education giving students a chance to explore their personal possibilities in the world of work.

Industrial arts' part in career education is almost self-explanatory, and I do not think I need dwell upon the possibilities industrial arts has to offer the career program. In fact, I feel no other program in education could have or still has as much potential as industrial arts. The very nature of industrial arts, being general education and not vocational education, and the tremendous exploratory programs in subject matter offer almost endless potential.

Its semi-skilled activities and hands-on experiences makes industrial arts the most natural and readily-accepted program in the careers system for the middle school level.

Career exploration and its possibilities is no new thing in the industrial arts curriculum, yet there are some major changes that must be implemented in industrial arts to make it a career subject. They are: (1) More time must be spent on career opportunities. (2) No skills, or few, are to be learned. Industrial arts is to be purely introductory. (3) The industrial arts teacher must be acquainted with all the possible job opportunities connected with the subject. (4) The subjects taught must have names which imply a more general area of study than the present names of courses indicate. This will enable the student to have a wider range of subject matter that will be of personal interest to him. (5) The industrial arts teacher cannot expect to keep his class working on a single unit at the same time in the careers program. More than likely he will have a class of 25 students working on 15-20 different areas, and each student working at a different speed. The learning packet becomes an essential part of industrial arts career education.

SOME IDEAS I AM EMPLOYING IN THE CAREER PROGRAM

Communication and Graphic Arts

The first thing is to introduce the class to drafting tools and equipment. I teach them the names and uses of these basic drafting tools. A section on how to print properly and to read a ruler is also given when necessary. Simple tasks are given to develop skills in the use of tools and equipment. I let the students choose a career opportunity that involves drafting. For example, some will choose architectural drafting, mechanical drafting, or design drafting. After the students have had an opportunity to try these different occupational areas with their new skill, they are required to complete a term paper on the career possibilities which they have chosen.

Transportation

The first thing I do is give a basic history of transportation, from the cave man to the present. The next thing, different methods of transportation are discussed. Power — wind, animal, water, and more modern forms — is discussed. Different motors that are used in transportation and how they work are studied. Career opportunities in transportation are studied and discussed by the entire class. Then an in-depth study is made by each student on the career in transportation he chooses.

Production Manufacturing

A brief history of manufacturing starts off our unit. The different methods of manufacturing are discussed and studied. We then turn our attention to company organizations and the way they are developed. Job possibilities in production and in manufacturing on all levels from the most manual-type labor to executive responsibility are discussed.

Now the fun part. A mock company is set up for role playing. A product is actually produced and marketed by the students, with all profit going to the students. To conclude the unit, reports are made on career opportunities and possibilities that interest the students.

SOME POINTS TO CONSIDER

We are repeatedly informed that industrial arts is the core of the career program. Personally, I feel that industrial arts is no more the core of careers than any other subject in the school's curriculum. It would be facetious to feel that industrial arts could possibly be more beneficial to a student whose career choice is pharmacy than chemistry or general science would be.

The level at which industrial arts offers the most to the careers program, according to the experts, is in the middle school and lower grade levels. Thus, in the comprehensive high school situation, industrial arts is completely avoided and replaced by vocationally-oriented subjects, thereby placing industrial arts into a feeder program.

The third problem is that colleges are not offering courses to the industrial arts teacher to help him teach in the careers program.

Mr. Hanks teaches at Hilsman Middle School, Athens, Georgia.

CONSTRUCTION

Technology through Construction

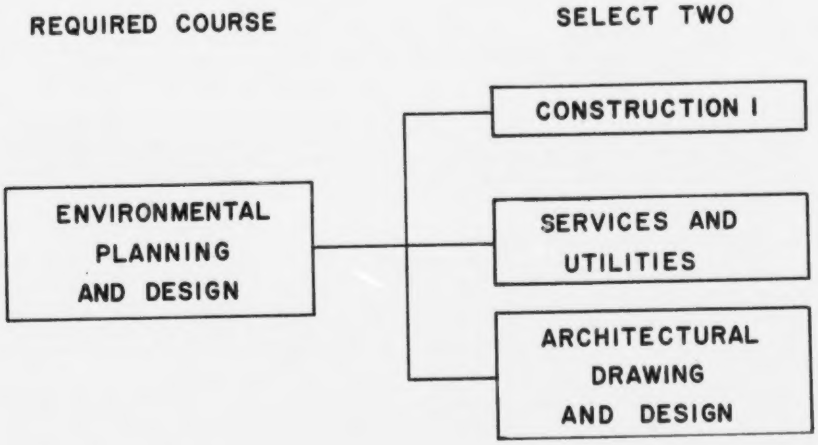
E. Keith Blankenbaker

This session was introduced as an opportunity to share experiences related to the teaching of construction technology. After ascertaining the background of those in the audience, several questions were asked to stimulate discussion.

In reply to a question regarding teaching education related to construction technology, Wes Boydson from State University College at Oswego gave the following report of a proposed construction technology area of concentration for undergraduate majors.

FIGURE I

OSWEGO CONSTRUCTION CONCENTRATION


REQUIRED COURSE
SELECT TWO
ENVIRONMENTAL PLANNING AND DESIGN
CONSTRUCTION I
SERVICES AND UTILITIES
ARCHITECTURAL DRAWING AND DESIGN

The construction concentration would require a student to earn nine hours of credit, as identified in Figure 1.

The topics included in each of these courses is as follows:

Environmental Planning and Design

1. Community Planning
2. Urban Development
3. Highway and Transit Circulation
4. Environmental Design
5. Curriculum and Professional Development

Construction I

1. Manufacturing Dwelling Units
2. Small Contracting Industry
3. Managing and Scheduling
4. Financing
5. Estimating
6. Surveying and Layout
7. Excavating
8. Masonry and Concrete Work

9. Rough Framing
10. Exterior Finishing
11. Interior Finishing
12. Landscaping

Utilities and Service

1. Heating Systems
2. Electrical Systems
3. Plumbing
4. Waste Removal and Treatment Systems
5. Service Industries
6. Cooperative Maintenance

Architectural Drawing and Design

1. Drafting tools, Techniques and Symbols
2. Pictorial Drawing and Elevations
3. Detail Drawing and Labor Plans
4. Plot Plans
5. Working Drawings
6. Specifications and Structural Materials
7. Architectural Models

Keith Blankenbaker reported the results of a study conducted among World of Construction (WOC) teachers for the purpose of ascertaining the way they learned the information necessary to allow them to teach WOC. The study showed that the knowledge required to teach the course was gained primarily from the following three sources in order of importance:

1. WOC Workshops
2. First year of teaching WOC
3. Work experience related to construction

Because very few of those who participated in the study reported having gained the knowledge and skill to teach construction technology as a result of an undergraduate teacher education program, it was decided to investigate ways in which the program at Ohio State could be modified to encompass all the major concepts of construction technology.

The undergraduate teacher education program which has evolved at Ohio State includes the basic concepts of construction in a number of courses. Many of these courses also have components which relate to manufacturing. The course titles and the principle contribution each makes to the understanding of construction are:

Required Courses	Content
Graphic Presentation I Graphic Presentation II Graphic Methods	Drafting Fundamentals, Pictorial Drawing, Blueprint Reading, Charts and Graphs
Industrial Practice in the Schools	Wood and Metal Hand and Power Tool Skills
Design of Constructed and Manufactured Goods	Environmental Considerations, Floor Planning, Aesthetics
Construction Practices I	Residential Construction
Construction Practices II	Commercial and Heavy Construction
Electrical Systems	Basic Electrical Theory, Low Voltage Circuits, House Wiring

Elective Courses

History of Contemporary Architecture
Work Experience in Industry
Elements of Surveying
Structural Drawing
Outlines of City Planning
Design of Gardens
Group Studies
Individual Studies

Following the description of the program, a number of questions were answered which helped clarify certain details of a curriculum plan which had been circulated among the conference participants.

Herb Mizer, Racine, Wisc., asked what type of construction program was being proposed by Ohio State for the secondary level.

FIGURE 2

TENTATIVE PROJECTION OF
A SECONDARY CONSTRUCTION
EDUCATION PROGRAM

GRADE LEVEL		
9 OR 10	11 OR 12	
AN ADVANCED "WORLD OF CONSTRUCTION"	CONSTRUCTION MANAGEMENT	CONSTRUCTION DRAFTING
		ESTIMATING & BIDDING
		ET CETERA
	CONSTRUCTION PRODUCTION AND SERVICING	ELECTRICAL TRADES
		TROWEL TRADES
		ET CETERA

Figure 2 describes conceptually the most recent Ohio State proposal of what a secondary construction education program might look like. At this time, money has not been found which would permit the Faculty of Industrial Technology Education at Ohio State to do anything more than dream about a secondary program. If money were to become available, this is beginning the "dream."

Mr. Lund from Minneapolis recommended block laying and a porch roof structure and scale model garage construction as activities which he had found very successful with inner-city youth. It was also mentioned by the group from Minnespolis that The World of Construction is being taught as a course in several of their junior high schools.

Several others reported successes with WOC as a course in the junior high school. The discussion during this part of the session centered on alternatives for teaching WOC at various grade levels, with different activities, and with varying scheduling systems.

Bob Shafer, Fort Lauderdale, Fla., mentioned the relationship of construction to the career education program in his state. The implication of the discussion which followed was that construction was an important part of career education and that ways must be found to provide realistic exploratory experiences which will permit students to study construction at all levels, K-12.

Leroy Unruh suggested that it is necessary for all industrial educators to focus their program on the future. This is especially true in construction because of the need to find more economical ways of meeting our housing, building, highway, and water treatment needs.

Don Darrow, Illinois State University, asked the participants to complete a questionnaire about construction education. This questionnaire sought information about the type of construction course being taught at the various schools represented.

A variety of alternate suggestions for activities were made. These suggestions included building storage sheds, using small partially prefabricated units to develop activities in plumbing, electrical work, drywall, plastering, etc.

The organized portion of the session concluded with the showing of a series of slides depicting student activities which have been used in the construction course at Ohio State.

At the conclusion of the session, the participants were invited to review a number of pamphlets related to construction and to take a copy of a bibliography of construction-related publications and teaching aids. Also, a copy of the "contract" being used in the construction courses at Ohio State was made available.

An extended discussion of various aspects of construction technology developed after the formal portion of the program. It was apparent from the comments that many of the participants were anxious to attend additional conference sessions which encourage a sharing of ideas. The reaction to the idea of conducting similar sessions at future conventions were very favorable.

Dr. E. Keith Blankenbaker is a member of the Faculty of Industrial Technology at The Ohio State University, Columbus, Ohio.

CURRICULUM

The Model for Technology for the Urban Society

Melbourne P. Van Nest

This model is a consortium program conducted by Newark State College and Newark College of Engineering in order to prepare the student for a career as a manager in a mechanical contracting firm operating in the construction industry. The role of mechanical contracting in construction is the installation of heating, air conditioning, ventilating, plumbing, and piping systems in apartment housing units, large buildings, and plants. In the advanced technology systems of today and the near future, the technologist applies his knowledge of physics, mathematics, and other sciences to the solution of problems encountered in the purchasing and installation of today's highly-complex systems.

To accomplish these goals, the mechanical contracting curriculum is divided into three general areas: general education, major requirements, and electives. General education has been stated as an ideal at Newark State College. It is viewed as a core of information that will provide the student with a broad academic background covering courses in the areas of humanities, science and mathematics, social and behavioral sciences and history, and health sciences. Students must complete a minimum of 36 semester hours in general education courses except when additional courses are required for certification or accreditation. (Thirty-six semester hours may be reduced to 33 semester hours if a student passes the equivalency in English composition.) Cognate courses or courses pertaining to the major may be taken within the general education requirements.

The program in general:

General Education	36
General education required of major	
Major requirements	88
Electives	
	124

Within general education, a major in mechanical contracting must take:

- Principles of Economics I & II
- College Algebra and Trigonometry
- General Physics I & II
- Labor Economics
- Analytic Geometry
- Computer Arithmetic Algorithms
- General Psychology

Major area of specialization coupled with electives is designed to develop a student in his major area. It is believed that a student will gain depth in his specialization through concentration in a core of courses, with elective courses being tailored according to the student's specific needs. This is extremely important for the transfer student. With this in mind, we submit the following:

MAJOR DEPARTMENT REQUIREMENTS:

Introduction to Industrial Technology — The purpose of this course is to survey the nature, content, and implications of careers in industrial technology. Analysis and discussion of the current critical issues of industry will be included.

Design Fundamentals — An investigation of the basic aspects and the traditional concepts of design and of their implication to contemporary design.

Preparation of Technical Documents — Advanced writing in scientific and technical fields; technical reports and papers, requisition procedures, personnel evaluations, and other communicative experiences of value to the technical-oriented man.

Industrial Law — Basic fundamental principles of industrial law, including the following areas: Introduction, Business Organizations, Contracts, Uniform Commercial Code (Sales), Mechanic's Liens, Labor Law, Tort Liability and Insurance, Workmen's Compensation, Bankruptcy and Insolvency, Environmental Law.

Business Statistics — The methods used for the collection, preparation, and analysis of business data, including sampling, the estimation of population parameters, index numbers, regression, and correlation.

Marketing — A general introduction to the field of marketing, consumer goods and industrial goods, production development, channels of distribution, advertising, and promotion and pricing.

Principles of Accounting I — An introduction to accounting concepts and principles involved in financial reports or proprietorship, partnerships, and corporations, including the techniques of debit and credit, trial balances, adjustments, and statements.

Construction Blueprint Reading — Blueprints from many types of construction projects are used in the classroom to acquaint the men with symbols, methods of dimensioning, and arrangements for details.

Quantity Surveys and Estimates — Systematic and rapid methods of quantity take-offs and proper tabulation of data are emphasized. The unit prices of materials and the methods of purchase are discussed.

Estimating and Contracts — A study of construction proposals; advertisements for bids, methods of preparing construction bids, contracts and specifications, the planning of construction of buildings, and the time sequences in construction operations.

Construction Supervision — A study of construction planning, plant, equipment, and management. Detailed discussion of construction methods and job organization is incorporated.

Business Law and Building Codes — Mortgaging and financing, laws of contract, bonds, mechanic liens, agreement and general relations between the client and architect. Investigation of codes such as the sanitary code and the wiring code.

Heating and Air Conditioning — Practical applications in the calculations of a residential heating load, commercial and residential cooling load. Properties of heating air, cooling air, cooling water, steam and humidity calculations using the psychrometric chart and psychrometric tables. The use of design heat transmission coefficients for walls, glass, and other structural members.

Refrigeration — Principles of refrigeration; refrigeration cycles, capacity and performance, refrigerants, vapor compression system, compressors, condensers, receivers, evaporators, auxiliary equipment, heat transfer, and insulation.

Heating Design — Description of heating equipment, including steam, hot water, warm air, panel heating, selection of equipment and accessories.

Air Conditioning Design — Humidification, dehumidification, heating and cooling, the problem of the movement of air in various installations.

Heating, Ventilating, and Air Conditioning Equipment — A comparative study of heating ventilating, and air conditioning equipment and their controls and appurtenances with respect to special features to watch for in their selection, purchase, and installation.

Building Equipment — Planned to alert the student to the implications that modern electrical and mechanical equipment has on building design. Housing of equipment, as well as space requirements for such equipment, will be included.

Plumbing Design — This course will include design of water supply, drainage, and venting systems. Special emphasis will be given to sizing and plumbing code regulations for New Jersey.

Electives — Electives are designed to be selected in consultation with the industrial-academic advisement team. Students are urged to select elective courses that will give them additional depth as well as reinforce an area of study which both the advisor and student feel necessary.

Mr. Melbourne P. Van Nest is an Associate Professor of the Industrial Studies Department at Newark State College, Union, New Jersey 07083.

Developmental Techniques for Establishing a Curriculum to Meet the Needs of the Urban Society

Glenn M. Thatcher

The concept for an industry-oriented curriculum can be initiated by either education or industry. If the concept is initiated by education, it must be substantiated by establishing a need on the part of industry in terms of the type of personnel that the curriculum purports to educate. Another factor which is of great importance at the offset in developing this type of curriculum is to establish the needs of industry which lie within the realm of responsibility of education. The department which is sponsoring the curriculum must critically evaluate administrative support of the institution involved. If administrative support is lacking, then the curriculum concept should be aborted at this point. Should the administrative report be positive, the next step is to assess the departmental resources in terms of staff, space, and equipment to support the curriculum. One enjoys thinking in terms of Utopia when considering staff, space, and equipment. When Utopia is not at hand, it must be realized that there are positive alternatives. For example, when adequate staff is not available to support the curriculum and it is evident that this facet of needs are not available in the foreseeable future, a consortium approach could be investigated with a nearby institution. The same could apply for inadequacies in space and equipment. Another possibility is to approach co-adjunct faculty to support such a program when full-time line item staff are not presently available at the home institution.

The point that is being made is the "where there is a will there is a way," and if strong ties are made initially with an appropriate industrial organization, this will be strengthened and the industrial association will often assist in showing the way in areas of consideration which might be deficient.

For any industrially-oriented curriculum, there surely must be an association to seek assistance. Here we find the dynamics of American politics which impressed Alexis De Tocqueville many decades ago. Having seen nothing comparable in Europe of his day, he said:

> Americans of all ages and all conditions constantly form associations that have not only commercial and manufacturing in which all take part, but associations of a thousand other kinds—religious, moral, serious, futile, general, restricted, numerous, or demunerative.

The advantages of soliciting the aid of industrial associations are truly unlimited. Such an association stands ready to act as a pool of resources. Consulting activities are unlimited. The initial consulting which would be appropriate in the development of an industrial curriculum would be a detailed activity description of the personnel in question. Assistance would be rendered in curriculum development from over-all curriculum to actual course content. Such an association would assist in identifying individuals for a well-balanced advisory council.

Educators of this decade are beginning to realize that there are many facets of education that cannot be taught within a framework of semester hours or classroom instruction. To enhance the curriculum, an active line of communication between education and industry can provide resources such as: monthly professional enrichment programs for majors in the program in question. The association can also be instrumental in placing majors in part-time and summer employment within the industry. Assistance can also be provided in the areas of student recruitment; the association would solicit sons and relatives of company owners and other personnel within the industry.

In some instances, the association could provide recruitment personnel and occasionally total programs for high school recruitments which might occur on the traditional college nights and career days. At Newark State College, the Mechanical Contracting Association has been instrumental in the development of a criterion for on-the-job experiences. This criterion was established to insure that the Mechanical Contracting Technology majors had worthwhile experiences during their summer employment, as opposed to menial tasks such as being an errand boy and so on.

Both the institution and industry felt it essential that students on the job receive experiences that would supplement their four-year experiences on campus. The Mechanical Contracting Association has also been responsible for developing a departmental library consisting of catalogs and specification manuals which could not be found in a typical college library.

In addition to curriculum development, personnel identification, and other areas of assistance which have been discussed previously, such associations can be extremely helpful in terms of financial assistance. Financial assistance can largely be divided into two categories: scholarships and equipment.

Scholarships can be awarded on many bases, but are largely based on financial need or scholarship. These two categories can be determined by working out the details with the industrial donor. In some instances, you will find financial assistance directed toward both categories.

In terms of equipment, I am sure that anyone who has been involved in industrial education for a period of time realizes that the technological advances, in terms of equipment, are at such a rapid pace that the educational purse strings cannot begin to keep up to date. However, through a strong cooperation with industry, equipment can be utilized in the educational setting through the aid of appropriate associations, companies, and/or affiliated vendors.

In closing, let me state that as a result of my experiences with the Mechanical Contractors Association of New Jersey, such a relationship has been extremely positive in meeting the needs of higher education, the industry, and most importantly, the student.

Dr. Glenn M. Thatcher is an Associate Professor of the Industrial Studies Department at Newark State College, Union, New Jersey 07083.

Technological In-Life Behaviors: Focus of the Texas Industrial Arts Curriculum Study, The Rationale and Discipline Models

M. D. Williamson

The Texas Industrial Arts Curriculum Study had its inception in 1966 when the Texas Education Agency asked the Texas Industrial Arts Association to assume a leadership role in revising the industrial arts publications of the agency and to produce guidelines for constructing and equipping industrial arts facilities in the state. Sensing that the curriculum was probably outdated, the group felt that to make a nominal revision of the publications at that time and to develop standards for facilities based on the existing programs would have insured the continued obsolescence of the industrial arts program for many years to come. For this reason, a study was initiated which would provide an opportunity for a complete revision of the curriculum. Funding for Phase I of this six-phase study was provided by the Texas Education Agency in 1969 in order to orient the 63 members of the interdisciplinary curriculum study committee, many of whom were not familiar with industrial arts in public schools.

Phase II was funded by the Texas Education Agency and the Moody Foundation of Galveston in the amount of $22,956.00. Its purpose was the development of a rationale for industrial arts in Texas which would serve as a guide for the structuring of a new curriculum, the goal of Phase III. This phase was funded by the Texas Education Agency and the Moody Foundation with grants of more than $45,000.00. Phases IV, V, and VI will consist of a tryout of the new courses in selected junior high schools and the preparation of the final curriculum study evaluation report. The study is scheduled for completion in 1975.

INTRODUCTION

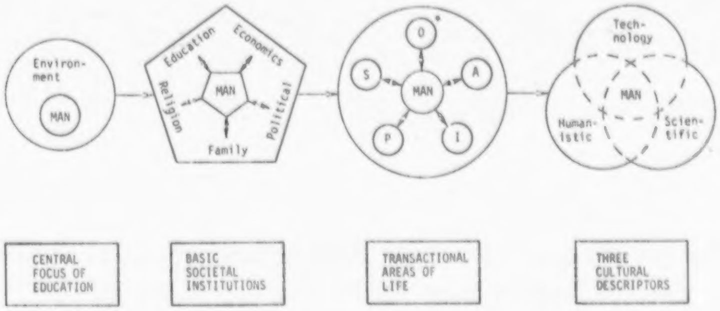
Phase II, which was completed in 1972, provided us with a rationale for industrial arts in Texas. We have in the past operated without a comprehensive statement of what our discipline is about. There has been little effort to explain why industrial arts is an important part of the curriculum in Texas.

The rationale is a lengthy document and permits a variety of interpretations. The models which are presented here are tentative. They have been prepared in order to relate the thinking thus far developed in the curriculum study. This first presentation will deal with the rationale and discipline models. The second presentation will deal with the goals model and the industrial arts curriculum model.

THE RATIONALE MODEL

It is axiomatic that our educational enterprise is supported to do certain things society wants done. The object of that education is the development of the individual student. Its goal is to help man achieve the good life. Its central focus, therefore, is on the common needs of man, its recipient.

Education (learning) takes place largely in the arena of life. The institutions which dominate man's life are educational, economic, political, family, and religious (12, p. 7). These are the institutions which provide the setting for man's contributions to his society.


Environ-
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CENTRAL FOCUS OF EDUCATION
BASIC SOCIETAL INSTITUTIONS
TRANSACTIONAL AREAS OF LIFE
THREE CULTURAL DESCRIPTORS

RATIONALE MODEL

* LEGEND
S - Self   A - Aesthetic
O - Others   I - Institution
P - Physical World

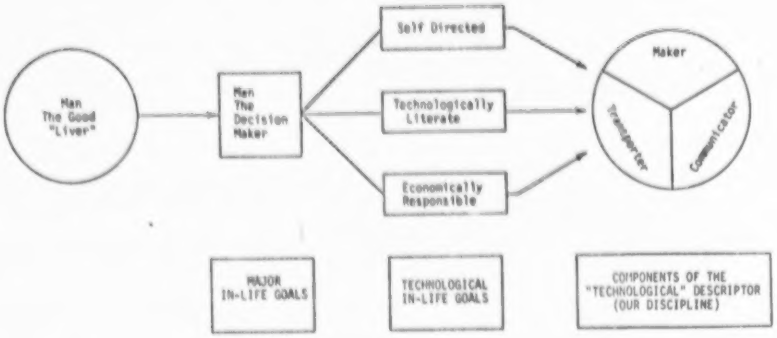
Texas Industrial Arts Curriculum Study - (1)
Tentative - For Discussion Purposes Only

As an individual, man interacts or transacts with himself, with others, with institutions, with the physical world, and with his aesthetic environment. These are the areas of man's life which motivate his activities and his goal development (16, pp. 41-43).

Man's education should take place in a school setting which is representative of his life outside the school. Traditionally, the school's greatest concern has been with humanities and scientific education for the masses. The school has displayed little real concern for technology, a third and equally important descriptor of our culture. Education is needed in the technological as well as the scientific and humanistic descriptors. This is a universal need for all youth—all boys and girls. This may raise serious questions as to the kinds of programs in industrial arts which are needed for all students and whether there presently is an adequate program for all. This, however, is not our special concern at this particular point in time.

DISCIPLINE MODEL

It is assumed that for man to achieve the "good life" he must be able to cope with his most important and persistent problems in life. It is, therefore, proposed that for



DISCIPLINE MODEL

Texas Industrial Arts
Curriculum Study - (2)

Tentative - For Discussion Purposes Only
Feb. 1973

man to be a "good liver" he must be able to make reasoned decisions.

In order for man to cope with his problems as a decision maker in a technological society, he must learn to be self-directing, technologically literate, and economically responsible. Some qualities which exhibit these characteristics are as follows:

1. A self-directed person:
   - -identifies his problems
   - -accepts responsibility for seeking valid data upon which to base his decisions
   - -makes and executes decisions with an awareness of their probable consequences
2. An economically-responsible person:
   - -is able to assess his potential
   - -selects a career based on his interests and abilities
   - -prepares himself adequately for a career in his chosen field
   - -is a wise consumer of the products of industry
   - -purchases, uses, and maintains products of industry in the best interest of his family and society
   - -provides for the economic needs of himself and his family
   - -is conscious of the need to improve the environment and conserve natural resources
3. A technologically-literate person:
   - -understands essential principles of our economic system
   - -views our technological culture in historical perspective
   - -uses and maintains the products of industry wisely
   - -relates basic scientific principles with their application in industry
   - -understands concepts of industry such as labor, management, research and development, quality and control, mass production, sales psychology, etc.

Man in a technological culture cannot function in a responsible way without achieving these in-life goals. Industrial arts, as a part of the general education of all youth, must contribute significantly to the goals of education in a technological culture. It must, therefore, help students acquire the ability to make reasoned decisions.

Technology is one of the major descriptors of our culture. It permeates the very fabric of man's life. It is to this aspect that industrial arts gives its attention. Technology then becomes the discipline from which industrial arts subject matter is drawn. The discipline of technology encompasses all of the technological activities of man which relate to man the maker, man the transporter, and man the communicator (2, p. 34).

All of man's industrial activities are subsumed under the above components which serve as reservoirs from which industrial arts subject matter is drawn. Through experiences drawn from these three components, industrial arts can help all students develop competencies relating to their major in-life goals. With the cultivation of these qualities, the products of schools will be better able to meet their responsibilities as decision makers and therefore more adequately achieve the ultimate goal of man the "good liver."

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Technological In-Life Behaviors: Focus of the Texas Industrial Arts Curriculum Study, Goals and Curriculum Models

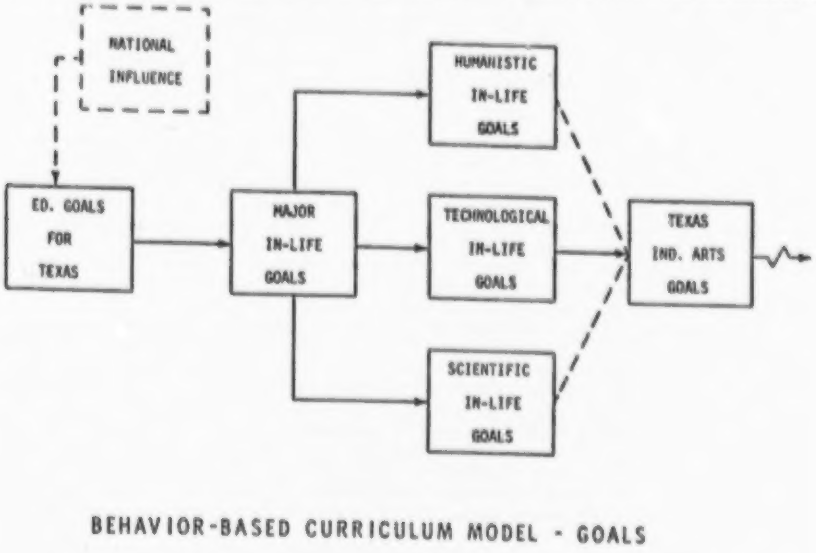
John R. Ballard

In another presentation[1] the tentative rationale and discipline models pertaining to this study were delineated. It was noted throughout the discussion of the rationale model that man is the focal point in education, in society, in the transactional areas of life, and in the culture that society has developed. This focus on man is a basic tenet of this study. The discipline model suggested that in man's pursuit of the good life his foremost task is to be a decision-maker — hence the major in-life goal for education. Three in-life goals were proposed to enable all citizens to function as decision-makers in the technological sector of our culture, and the discipline of technology was suggested as the vehicle for implementing these goals. With the rationale and discipline models developed, attention now is directed to the tentative goals and curriculum models.

Goals Model (see Figure 1)

Within each state there is a group duly authorized to develop broad goals for education, and these goals are used in planning curricular offerings for schools. According to the discipline model proposed for this study, there is one paramount in-life goal that all schools should focus upon, and that is to develop learners who can make well-reasoned decisions. In addition to this major emphasis, there are obviously other worthy goals needed by all learners to help them cope with in-life problems they will be facing living in our culture. To ascertain these worthy goals, one must determine the in-life competencies needed by all learners in order to successfully function in a culture described in the rationale model as humanistic, scientific, and technological.

Once in-life goals evolved from the three domains of our culture are determined, one has defensible aims on which to base a curriculum that is relevant to all learners.



BEHAVIOR-BASED CURRICULUM MODEL - GOALS

Figure 1

Each curricular area can then emerge with its own set of in-life goals. From the humanistic descriptor we get English, history, etc.; from the scientific descriptor we get mathematics, physics, etc.; and from the technological descriptor we get engineering, industrial arts, etc. Because industrial arts concerns are primarily those that technology impinges upon the learner, it follows that most of the selected goals should relate more directly to the technological descriptor, whereas secondary emphasis should come from the humanistic and scientific domains. This latter fact is well-documented in the set of goals for industrial arts generated by the committee responsible for writing the rationale for this study.[2] The following is a list of these goals:

1. To develop the competence (ability) to investigate the characteristics of industrial technology and to evaluate its influence upon our culture.
2. To develop competence (ability) in making and executing decisions necessary to the solution of problems in our technological culture.
3. To develop competencies (abilities) needed to assess one's abilities and interests, to make career and leisure-time choices, and to pursue studies in a chosen field.
4. To develop competencies (abilities) to act responsibly, to practice acceptable work habits, and to be socially adjusted.
5. To develop the competence (ability) to use safely common industrial tools, machines, materials, and processes.
6. To develop the competence (ability) to select, use, and maintain products of industrial technology.

Once such a set of goals is formulated for a curriculum area, those charged with the responsibility can proceed with the task of developing the curriculum.

Knowledge-Based Curriculum Model

After the goals for a curriculum have been identified, the traditional next step is to organize the curriculum into courses, set forth objectives for each course, select content to be taught in the said course, arrange the courses and content according to principles of scope and sequence, etc. When this general procedure is followed, one must conclude that advocates of this procedure are proponents of an educational model founded upon the acquisition of knowledge. The assumption is that once knowledge has been acquired, behavior will be modified. Let's illustrate several typical industrial arts approaches.

1. Subject Matter — textbooks; courses of study; curriculum guides. This curriculum model emphasizes the memorization of data, making the acquisition of knowledge the guiding criteria. Those sharing this posture should be able to provide suitable answers to such questions as these. Is the possession of verbal information tantamount to being educated? What percentage of this knowledge is meaningful to students today; tomorrow? To what extent does knowledge influence (alter) one's daily in-life behavior? Should our elementary and secondary schools produce "scholars" with bodies of knowledge or students having competencies with which to cope successfully with their environment? Do students memorize verbal information to pass examinations in order to beat the system or engage in direct meaningful experiences in order to develop concepts which will guide their in-life behaviors? Since evidence suggests that knowledge is primarily fodder for thinking and contributes less than concept development to the altering of one's behavior (learning), then educators should increase their understanding of learner behavior and of the nature and function of concept development in planning curricula.

2. Community Needs — survey the community. Producing a curriculum using this approach places the educational focus upon what is best for the community. Is it not probable that so-called community needs identified by this technique are based upon vested interests; upon unexamined prejudices; or upon occupational biases? Will an emphasis upon meeting community needs be as likely to meet learner needs such as being self-directed, economically responsible, and technologically literate? Moreover, how long will students be expected to remain in the community for which they are educated to help? Should schools be established foremost to satisfy the needs and wants of learners or of the community? If learners developed competencies for daily real-world encounters while also supporting community needs, this approach would not be particularly objectionable — but how can one be certain?

3. Tradition — local; state; national. Some perpetuate particular programs because of a heritage syndrome; or because there are certain "basic things" that all should "know"; or because it is taught elsewhere. If we continue the present traditional indus-

trial arts curriculum (circa 1950)—e.g., the acquisition of knowledge and the development of manipulative abilities—can we hope to produce learners competent to contend with today's dynamic technological society? According to the evidence generated in the Phase II teacher workshops of this study, Texas industrial arts teachers do not agree that past practices and traditions are necessarily valid guidelines for curriculum decision-making in our present technological culture. They overwhelmingly registered a desire to place more emphasis upon technology. Therefore, rather than continue our present curriculum direction, it is proposed that teachers should channel their creativity into helping students develop concepts about technology thereby increasing the probability that student/teacher goals will be attained.

4. Analysis Technique — job/task; industry; business. A sound and valid procedure to learn the critical properties of any phenomena is to analyze it. To learn what a tradesman, or musician, or a doctor does, just analyze the tasks they perform. To learn about an industry or business, analyze its component parts. But how does one go about analyzing industrial arts, or should it be analyzed? Should one analyze the industrial tools and materials worked with, or the processes and tasks related to the occupational categories found in our curricula? Or should we analyze technology and from this procedure organize a body of knowledge and call it our discipline? Following this approach implies that our primary concern is to gain knowledge about tools, materials, processes, jobs, or a discipline. Most analyses of industrial arts follow this general pattern. To justify the approach, one must presuppose that knowledge gained from it will effectively and efficiently alter behavior. However, much evidence exists to refute this assumption. Perhaps we are asking the wrong question or analyzing the wrong components.

In this review of the knowledge-based curriculum illustrated by four typical industrial arts approaches, an effort has been made to indicate or infer that the following problems prevail in education today.

1. The goals of education are the accumulation of knowledge, although accumulation of knowledge is less effective and efficient for preparing one for daily in-life activities.
2. There is a perpetuating force that tends to fragment the curriculum and lessens the learners' potential to develop in-life competencies—the real purpose of education.
3. There is a reduction in the probability of having interdisciplinary curricula, thereby minimizing conceptual development, the principal mediator of our behavior.

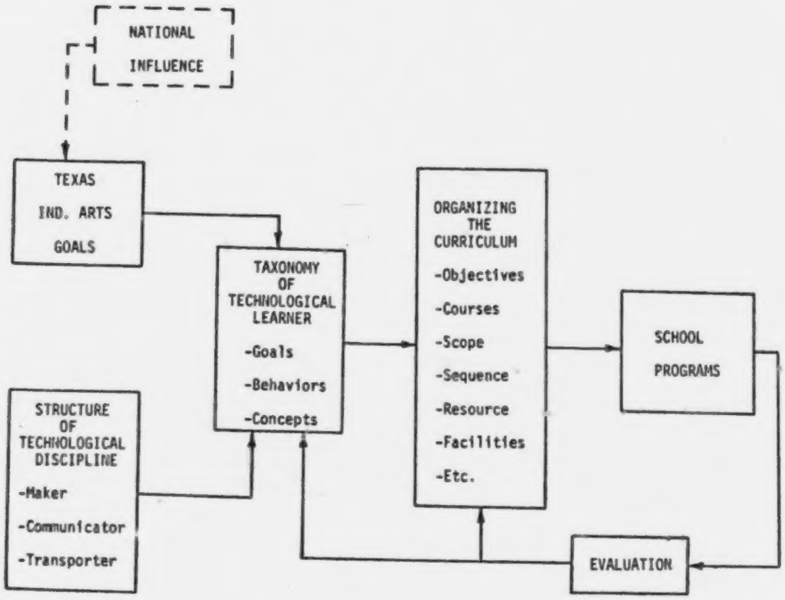
The assumption is made that these are valid educational problems, and furthermore that they are derivatives of the knowledge-based curriculum model; therefore, leaders associated with this curriculum study decided to shift to a behavioral-based model. A brief review of this model will be discussed next.

Behavior-Based Curriculum Model (see Figure 2)

A unique feature of this study is its emphasis upon learner goals, behaviors, and concepts. Each of these will be discussed in general, but the theoretical background undergirding them is beyond the scope of this paper. A thorough explanation of these components is available in the professional literature. The following discussion proposes a method to develop a curriculum for learners living in a technological culture.

The initial step in developing a behavior-based curriculum model about technology is for a teacher or group of teachers to generate in-life goals for learners, based upon the broad goals established for industrial arts in a given state. In-life goals are competencies that learners need in order to cope successfully with the problem of existing in a culture. To identify in-life goals for an industrial arts curriculum, it is necessary to analyze our technological culture. This procedure will produce a comprehensive array of goals if the analysis is filtered through each transactional area of life mentioned in the rationale model. A significant product produced by this technique is a set of goals which are relevant for all students. They also provide the teacher with a criteria by which to evaluate student-selected goals. Student-selected goals are generated by wants which motivate the student to learn whatever is necessary to fulfill these desires. The first step of this procedure is concluded when a comprehensive taxonomy of learner goals relative to technology is developed. This taxonomy serves as the primary resource base from which the curriculum worker will infer behaviors that are to be developed by learners while participating in an industrial arts program.

With the taxonomy of learner goals developed, the curriculum developer is ready for the next step, which is to ascertain the best way to attain these goals. To attain goals


NATIONAL INFLUENCE
TEXAS IND. ARTS GOALS
TAXONOMY OF TECHNOLOGICAL LEARNER
-Goals
-Behaviors
-Concepts
STRUCTURE OF TECHNOLOGICAL DISCIPLINE
-Maker
-Communicator
-Transporter
ORGANIZING THE CURRICULUM
-Objectives
-Courses
-Scope
-Sequence
-Resource
-Facilities
-Etc.
SCHOOL PROGRAMS
EVALUATION

BEHAVIOR-BASED CURRICULUM MODEL - INDUSTRIAL ARTS

Figure 2

requires that the human organism do something, and such an activity is called behavior. Woodruff has defined behavior as what man does. Contrary to some viewpoints, this definition includes any overt or covert response that man makes to his environment. Therefore, behavior not only encompasses man's visible acts or the products of these visible acts, but also what he thinks.[3]

Behavior is the human phenomena that attains goals. Once a teacher understands this, it should be apparent that a comprehensive list of behaviors to be developed in learners is imperative. Obviously, the behaviors which should be selected are those needed by learners to attain the in-life goals previously developed.[4]

Inherent in developing a behavior-based curriculum of this nature is a group of educators willing to sharpen their understanding of the nature and scope of behavior which is quite extensive and challenging. It must be emphasized that the behaviors under discussion are not the behavioral objectives so popular in education today. Rather, reference is made to holistic behaviors, which are acts performed upon some substance resulting in consequence.[5] The following examples illustrate some typical holistic behaviors relative to industrial arts: explore the organization of an industry; produce a useful product; maintain a manufactured product, etc. A major characteristic of these kinds of behaviors is that they are the end product for the learner, whereas the behaviors most often expressed in behavioral objectives are only a part of the end product, called sub-holistic. Behavioral objectives are certainly useful for lesson planning but only holistic behaviors are recommended for curriculum planning. This segment of the behavior-based curriculum is complete when a taxonomy of holistic behaviors needed by learners to competently cope with their technological environment is developed.

After learner goals and behaviors have been generated and categorized into taxonomies, the final step in developing this unique behavior-based curriculum model is to determine the cause of behavior. Equipped with this understanding, the curriculum designer is better prepared to create a relevant curriculum.

According to Woodruff, the concepts of an organism are the basis upon which his behavior is determined. In addition, concepts are not taught; rather, we provide experiences for the learner and, based upon these experiences, he develops his own personal concepts. It is this mental construct that his mind has generated that causes his behavior to respond in the manner that it does.^{6}

Concepts are formed by the learner while he is engaged with subject matter. A significant portion of the subject matter relative to industrial arts comes from the technological environment, which we call our discipline; consequently, it would serve as resource material used in creating learning experiences designed to produce student-developed concepts.

If we can provide appropriate learning environments to cause learners to develop certain concepts, we can predict their behavior; and furthermore, if we know which behaviors they manifest, we can also ascertain which goals can be attained. This chain of events undergirds an understanding of this curriculum model.

Obviously, a third taxonomy is needed to complete the behavior-based curriculum model — a taxonomy of concepts. Teachers can draw from this resource when creating instructional strategies to achieve particular behaviors in learners in order to reach specific in-life goals.

After the three taxonomies are fully operational, the remaining steps for developing this curriculum follow the traditional curriculum development pattern relative to courses, scope, sequence, facilities, etc.

Summary

Those curricula which emphasize the memorization of verbal information have been referred to as knowledge-based curricula. A curriculum founded upon this assumption is questionable until more evidence is available to show that the mere acquisition of factual data contributes significantly to altering behavior, which is the primary reason for having a curriculum.

However, a curriculum founded upon the known critical characteristics of behavior as it relates to competency development and upon the awareness of the developmental process of concepts and how they function to direct our daily actions, gives one these advantages:

1. The goal of education becomes competencies (or behaviors) needed for in-life activities.
2. The curriculum is based directly upon the phenomena it is supposed to produce.
3. Knowledge that is needed to develop an in-life behavior is learned while one engages in behaviors.
4. Knowledge learned while engaged in a direct experience has meaning to the learner and is not an exercise in memorizing verbal data.
5. The determination of subject matter to be included in a curriculum is governed solely by what concepts learners need to develop.

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Revitalization of an Urban Industrial Arts Program through School Reorganization

Donald V. Miller

The City of Alexandria, Va., population 111,000, is located in the Washington, D.C., metropolitan area. It has a public school student enrollment of approximately 17,000. There are 16 elementary schools (grades K through six), three middle schools (grades seven and eight), two high schools (grades nine and ten), and one senior high school (grades eleven and twelve). The secondary school enrollment is approximately 7,100. Due to the lack of area for expansion, the city's population has somewhat stabilized. The non-white student enrollment is 37%.

The formal industrial arts classes do not begin until students reach the secondary school level (grades seven through twelve). During the 1972-73 school year, approximately 1,440 secondary students (20% of the secondary enrollment) are enrolled in industrial arts classes. The industrial arts class titles are as follows: General Industrial Arts (middle school), Communications Technology, World of Manufacturing, World of Construction, Power and Transportation, Photography, Graphic Arts, Electricity/Electronics, Mechanical Drawing, General Industrial Arts 11-12, and *Conservation of Natural Resources.

During the spring of 1971, the Alexandria City School system reorganized the secondary school structure. The three middle schools remained unchanged, other than attendance boundaries. The three separate senior high schools, grades nine through twelve, however, were changed to one senior high school (grades eleven and twelve) and two high schools (grades nine and ten).

The industrial arts programs in the three senior high schools were very diverse and in some cases inequitable prior to reorganization. The course offering was as follows:

High School #1
Woodworking 1, 2, 3, 4
Metalworking 1, 2, 3
Mechanical Drawing 1, 2, 3
Graphic Arts 1, 2
Power Mechanics
Electronics 1, 2, 3

Teaching Staff - 16

High School #2
General Industrial Arts 1, 2
Electronics 1, 2
Mechanical Drawing 1, 2

High School #3
General Industrial Arts 1, 2
Mechanical Drawing 1, 2
Electronics 1, 2
Woodworking 1, 2

The course offering after reorganization is as follows:

High School #1
(grades 9-10)
World of Construction
World of Manufacturing
Communications 1 & 2
Power and Transportation 1 & 2
*Conservation of Natural Resources

High School #2
(grades 9-10)
World of Construction
World of Manufacturing
Communications 1 & 2
Power and Transportation 1 & 2

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*New course proposed for 1973-74.

High School #3
(grades 11-12)
General Industrial Arts 11
General Industrial Arts 12
Mechanical Drawing 1 & 2
Electronics 1 & 2
Graphic Arts 1 & 2
Photography
Teaching Staff 18

One of the primary reasons for the reorganization of the secondary schools of Alexandria was to provide for a racial balance in enrollment. The change provided an excellent opportunity for reorganization of various instructional programs, particularly the industrial arts curriculum.

The advent of new and rapidly-advancing industrial processes has made many traditional industrial arts subjects obsolete in relation to contemporary industrial scenes throughout the country. With this concept in mind, many of our unit-shop type courses were replaced with introductory and/or exploratory courses in which more emphasis is placed on industrial technology.

Steps taken in implementing the new curriculum patterns in industrial arts were as follows:

1. All industrial arts teachers enrolled in in-service graduate school classes. Each completed one or more of the following courses: World of Manufacturing, World of Construction, New Curriculum Patterns in Industrial Arts, Communications Technology, and Power Technology. Classes were sponsored by the Virginia State College, Petersburg, Virginia.
2. Requested representatives from various industries to serve as resource people in curriculum development. Many demonstrations and field trips for the industrial arts staff were organized by these resource people.
3. Established extensive classroom and departmental renovation.
4. Established a close working relationship with Industrial Arts Services, State Department of Education.
5. Purchased or leased many new items of equipment—particularly in the area of Communications and Power Technology.
6. Developed promotional material for distribution to guidance personnel, students, and parents.

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Educational Reform through Performance-Based Curriculum

A. Dean Hauenstein

Long-term educational reform starts at teacher education institutions. There are new directions in teacher education programs aimed at increasing teaching competence and curriculum relevance. Many educators at national, state, and local levels have recognized the desirability of a system which calls for defining and demonstrating the specific teaching competencies which do, in fact, promote pupil learning relevant to life today and the next century. Such a system has generally been interpreted as a performance-based approach to teacher education.

This discussion presents a brief orientation to teacher education reform through developing performance-based curriculum as implemented by the Division of Vocational and Technical Education at Florida International University. This material may be helpful to those who anticipate moving in the direction of criterion-referenced instructional systems.

A performance-based curriculum includes what to teach, how to teach it effectively and efficiently, and knowing when it has been learned. For industrial arts, what to teach is determined by an analysis of a field of human activity within an industrial and educational system; their goals, processes, and content. How to teach it is determined by factors of competencies to be mastered, equipment, facilities, cost, student ability, teacher educator ability, and safety regulations, to name a few constraints. Knowing when it has been learned is determined by comparing behaviors to prespecified performance criteria.

There are four significant elements that characterize the performance-based curriculum in industrial arts:

1. A behavioral base (body of knowledge). An identified body of behavioral functions resulting from an analysis of an industrial or educational system: its goals, processes, and content.
2. Prespecified competencies.
3. Multiple options for training.
4. Feedback from performance.

To implement performance-based education, four conditions must exist:

1. The legal framework of statutes, regulations, and administration policies must be established.
2. Competencies must be specified.
3. Training programs and instructional materials which will develop the specified competencies must be established.
4. Systems for monitoring the mastery of competencies must be established.

Developmental efforts in all of these areas have been initiated at Florida International University.

Any given curriculum in teacher education has two basic practices: professional and technical. Professional practices are those common processes and techniques used by all teachers; e.g., in teaching: lesson planning, asking questions, demonstrating, presenting, lecturing, interacting, and the like. Technical practices are those knowledges of process and techniques special to the discipline the person will teach; e.g., in industrial arts: designing, engineering, and fabricating.

Developing a performance-based curriculum places a heavy responsibility on the curriculum planner. The planner is responsible for organizing a body of behavioral knowledge (principles, processes, practices, and techniques). The planner is responsible for specifying, in "task" or "behavioral" terms, those knowledges and activities that ultimately develop the desired behaviors. Facilitating students to be able to know and do these things at the acceptable level of performance becomes a central goal of instruction. Further, assessment must also be in these same performance terms. This accounts for the necessity to move from norm-referenced to criterion-referenced evaluation devices. Even more important, implementation moves from a data-based curriculum to a behavior-based curriculum.

Perhaps the most difficult task for the curriculum planner is to conceptualize, codify, and organize a body of behavioral knowledge for the professional and technical courses. The second most difficult task may be to decide knowledge and performance priority. Once the total body of behavioral knowledge is conceptualized and organized, it must be packaged so as to ensure that any one student will develop an acceptable level of competence. Courses must also be packaged to allow students to develop higher levels of performance in additional courses which at the same time do not overlap or omit essential behaviors. A performance-based curriculum for the professional practices places a requirement on the training program to devise or arrange opportunities to "perform." This calls for more extensive field orientation and work in the public schools or more realistic simulations of classroom conditions. Another difficult job is to describe "tasks" (performance activities) and "enablers" (enabling knowledges) in measurable behavioral terms. And lastly, the problem of the level of competence and knowledge that any licensed teacher should have is always open to question.

A SYSTEMS APPROACH

Performance-based curriculum is founded on a systems point of view. The systems approach can be characterized as a way of looking at the world and describing functional relationships among its entities. Thus, if we define society as our world, the entities may be (in terms of major classes of human activity) the family, government, education,

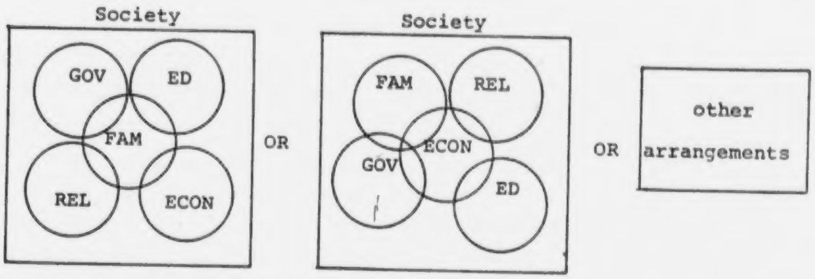


Fig. 1. A Conceptualization of Society and its Entities. A system is defined by its collective entities or parts and their relationships.

religion, and the economic system. This particular relationship can be conceptualized as in Figure 1.

In education we are concerned with the relationship of educational activity to all other activity of society. More specifically, we are concerned with how to teach and learn the knowledges of all entities through an educational system. In industrial arts, we are more specifically interested in the relationship of education to the activities in the economic system. More precisely, we are concerned with industrial activity as a subelement of the activity of the economic system. Even more precisely, we focus on construction and manufacturing processes which change the form of materials to satisfy man's wants for material goods. Thus, our educational purpose and goal is to present the total construction and manufacturing activity.

The systems approach is a tool for conceptualizing relationships of entities within a system. All systems can be characterized by their inputs, processes, and outputs. For curriculum design, systems can be characterized as having a purpose, process, and content. See Figure 2.

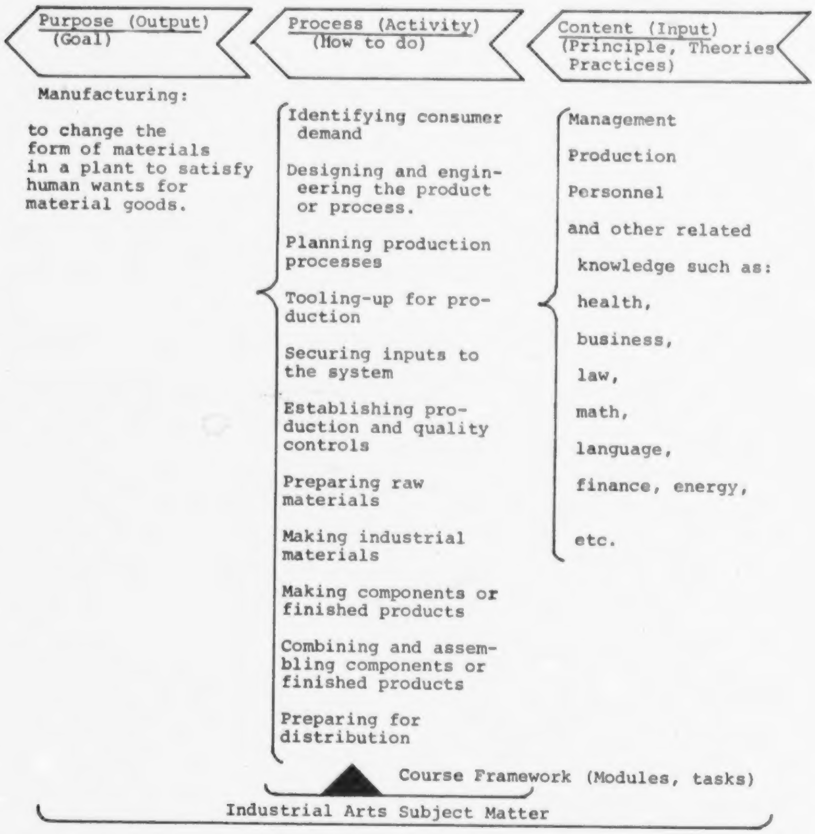
To achieve the educational goal, students should know about a number of items under content (principles, practices, theories, etc.) to be able to do the process (activity) to understand how manufacturing, for example, achieves its objective. Purpose, process, and content make up the subject matter for a study of industry. Procesees can be equated with modules or tasks and content can be equated with enablers (those principles, practices, and processes that help you do the task at a specified level of performance.) In a performance-based industrial arts curriculum, the competencies to be achieved are the processes of a system. Industrial arts in most any given school setting has traditionally focused on a few of the processes at the exclusion of purpose and content. Most academic disciplines have focused on content at the exclusion of process or purpose. For industrial arts to be a total study of industry, the school must at some time package and present curriculum representative of all of the processes and content, however they are defined. For youth to be fully knowledgeable and competent at some level of proficiency, they must be exposed to all of the processes and content within a given purpose. It is not possible to equate drafting, woodworking, metalworking, graphic communication, plastics, electricity-electronics, and the like as the major purpose of industrial activity or its total content.

This fact has tremendous implications for teacher education, in that universities and colleges must develop teachers knowledgeable of the whole rather than just a few of the parts. It is the youth who are eventually shortchanged when teacher education institutions cling to fragmented programs. If we are serious about educating youth to knowledgeably function in a 21st century society, we must develop teachers competent to meet the task. Many industrial arts programs are only distantly related to the real world of industry in process, content, or purpose.

DEFINITIONS AND FORMAT

Before proceeding to develop a performance-based curriculum, it is helpful to examine a few definitions and a plan for presenting the material. The Division of Vocational and

Fig. 2. Example of a Systems Purpose, Process, and Content.


Purpose (Output)
(Goal)
Process (Activity)
(How to do)
Content (Input)
(Principle, Theories
Practices)
Manufacturing:
to change the form of materials in a plant to satisfy human wants for material goods.
Identifying consumer demand
Designing and engineering the product or process.
Planning production processes
Tooling-up for production
Securing inputs to the system
Establishing production and quality controls
Preparing raw materials
Making industrial materials
Making components or finished products
Combining and assembling components or finished products
Preparing for distribution
Management
Production
Personnel
and other related knowledge such as:
health,
business,
law,
math,
language,
finance, energy,
etc.
Course Framework (Modules, tasks)
Industrial Arts Subject Matter

Technical Education at Florida International University is using the following definitions and format for industrial arts education.

Definitions

Course: A universe or major function of human industrial activity; e.g., industry, construction, manufacturing, industrial research and development, materials processing and fabricating, mechanical systems, electrical-electronic systems, communications.

Module: One of the major functions or steps in a process leading to goal achievement. A course must contain at least two modules and should probably have no more than seven or eight modules. The number of modules will vary with the universe defined and the amount of instructional time.

Task(s): Statements of activity or performances that exhibit the level of competency expected under given conditions. There must be at least two tasks, but preferably no more than seven or eight. The number of tasks will vary according to the module universe and the amount of instructional time. The tasks provide evidence of being able to apply enabling knowledges, attitudes, and skills in a situation the same as or similar to the enabling situations.

Enabler(s): Criterion-referenced statements of activity or performance that exhibit comprehension and application of content, principles, knowledges, processes, techniques, terminology, etc., under given conditions at specified levels of competence. There must be at least two enablers, but preferably no more than seven or eight. Again, enablers will vary with the task and time.

Format

Course - title page
Introduction - why this course is important
Goal - purpose of course
Table of contents
Module I - title of process
Introduction - why module is important
Goal - purpose of module
Entry Requirements - prior knowledge prerequisites

Task I - name of activity, conditions, level of performance

Enabler 1
Enabler 2
Enabler 3
Criterion-referenced statements of content competencies, conditions, and levels of acceptable performance which enable you to perform the tasks at an acceptable level.

Instructional Resources

Module II - title of process (repeat subelements as in Module I)

DESIGNING THE COURSE

The following guidelines may help you conceptualize a body of industrial functions (behavioral knowledge) which will contain the course modules. The terminology used for this task is crucial. It is suggested you use only words ending in "ing". Gerund nouns (ing words) set the behavioral context as process or activity. Thus, rather than say design use designing, rather than plan use planning, for fabricate use fabricating, construct—constructing, electricity—wiring or testing circuits or whatever one is doing when he is electricity-ing. Since the goal is to develop performance competency, the structural framework should be in terms of concepts denoting doing. The ing word states activity or behavior one is performing; e.g., teaching, sawing, demonstrating, drafting, engineering, researching, and the like. There is a vast difference between the concept research and the process of researching, between the concept demonstrate and the process of demonstrating, between the concept saw and the process of sawing, etc. The ing word is of a behavioral base, while the noun is of a descriptive or data base.

Guidelines

1. Identify a professional or technical universe.

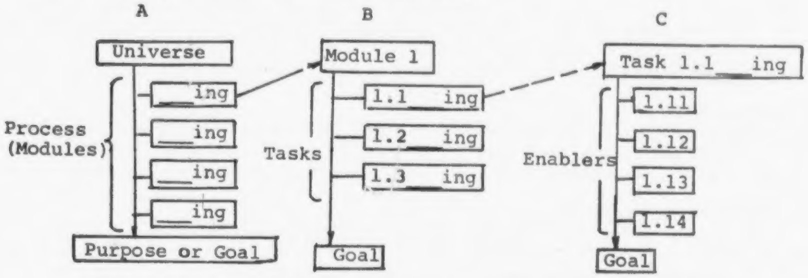


Fig. 3.A. Model of a Universe, Its Processes (Modules) to Achieve Its Purpose or Goal
3.B Model Showing Delineation of Module Universe, Goal, and Tasks
3.C Model Showing Delineation of Tasks Universe, Goal, and Enablers

2. Identify a major purpose of human activity within that universe. In the case of industrial arts, identify a major purpose or function of industrial activity.

3. Identify the basic processes through which the purpose is achieved. Use ing words.

4. Arrange the processes or steps in a logical order.

5. Draw a diagram illustrating the universe, purpose or goal, and process. See Figure 3 A.

6. Ask yourself, Do the parts equal the whole? Do the processes, as listed, achieve the goal? Are there any major processes omitted that should be represented? Adjust the processes until there is a logical flow to reaching the goal. Use ing words.

7. Ask yourself, Do the singular processes or steps overlap with one another? Are the processes mutually exclusive? Adjust the terminology to reduce any overlap. Use ing words.

8. It is vitally important to consider the universe — process-goal relationships — at length, for once established, these concepts will determine the parameters for all else that is contained in the course. The processes will become the module titles.

DEVELOPING PERFORMANCE-BASED MODULES

Establish the Modules

Modules are the sub-universes or steps in the process. Modules contain the tasks and enablers which develop the competency to perform the singular and over-all processes. The following are guidelines that may help you develop performance-based and criterion-referenced learning experiences.

1. State the name of the universe (one of the steps in the over-all processes) and state its purpose or goal.

2. Identify the major steps or processes through which the goal is achieved — minimum of two steps, maximum of seven or eight steps. Use ing words.

3. Arrange the processes in a logical order.

4. Draw a diagram illustrating the module (universe), purpose, and processes. See Figure 3B.

5. Apply the criteria of total inclusiveness to the module universe (parts to whole). Do the tasks (module processes) as listed achieve the goal? Are there any major tasks omitted that should be represented? Adjust the module tasks until there is a logical flow to reaching the goal. Use ing words.

6. Are the tasks mutually exclusive? There should be no overlap of function. Adjust the task terminology to reduce overlap. Use ing words.

7. The module tasks are the processes to achieve the module goal.

Determine Instructional Time

Determine how many instructional periods in minutes are to be allotted for the course. Compare the number of modules and their tasks with the number of instructional minutes and determine how much time can reasonably be allotted for each module and task. Assuming the tasks you have identified are equally important, they should therefore be allotted equal time. However, by their very nature, some tasks take longer to accomplish than others. Designate a tentative time span for each task and module.

Develop Enablers

Analyze each task for essential knowledge, attitudes, skills, and techniques needed to be able to do the task. See Figure 3C. Write singular instructional objectives for each enabler stating the name of the act, the conditions, and level of acceptable performance.

Identify Enabler Resources

Read each enabler and identify what information is required. Conduct a search for instructional resources; references, charts, diagrams, demonstrations, visual aids, etc. List the instructional resources for each enabler, citing topics or page numbers, name of demonstration or presentation, or where the student can obtain the information.

Write Task Statements

Review the task enablers and write a situation or problem which applies the knowledge contained in the enablers. State the task (activity), conditions, and level of acceptable performance. Repeat the process for each task.

Write Module Goal Statements

Review the tasks in a given module.
Write a statement that summarizes the tasks.
Repeat the process for each module.

Write Entry Requirements

Consider each task, the level of performance, and the knowledge required to perform it.

Determine what entry level ability one should generally have before attempting the module.

Write a statement of entry requirement. Example: Completion of Module I and knowledge of plane geometry.

Write Module Instructions

Review the tasks, enablers, and goal.

Write statements that overview the tasks and develop the need for the module. Tell why the module is important and how its achievement can be of benefit. Repeat the process for each module.

Write Course Goals, Introduction, and Table of Contents

Review the modules and summarize the goals of the modules.
Describe the outcomes of the course.
Write an introduction to the course, overviewing the course and its importance.
Write table of contents and title page.

Duplicate and Disseminate

Duplicate copies of the course.
Distribute copies to each student in the course.

EXAMPLE TASKS AND ENABLERS

Space does not allow for a full module; however, for illustration purposes, an example of a few tasks and enablers present the idea. The following tasks and enablers were selected from the Course EIA 406 Industrial Research and Development.

The course modules are:

I Defining Research and Development
II Formulating
III Researching
IV Designing
V Engineering
VI Production Planning

The following tasks and enablers relate to Module V; Engineering.

Task 5.1 Defining Terms

Given five written episodes of engineering practices and procedures, the student will with 100% level of performance, within one hour, identify the episodes which employ engineering practices and procedures.

5.1 Enablers

5.1.1. The student will read Ref. No. 3, p. 87, and in 50 words or less define "engineering."

5.1.2. The student will read Ref. No. 3, pp. 92-94, list the seven engineering practices, and write a one-sentence explanation of each.

Task 5.2 Material Testing

Using the product design approved in Module IV, the student will be able to, within two instructional periods, select component materials of questionable performance, test the structural function of the material, and modify the design or material based on the test data so that the product is within the product design criteria specified in Mod. III.

5.2 Enablers

5.2.1. Using your product model design approved in Module IV (4.52), the student will name at least two component materials that appear to be of questionable performance related to structural function and write statements expressing the condition.

5.2.2. After observing a demonstration on materials testing, the student will select at least two conditions, test the material according to its function, and record the data on Course Handout No. 32.

5.2.3. After comparing the test data to the design criteria in Module III (3.21), the student will state in writing, in 200 words or less, what components or materials should be modified and the effect of the modification on product cost.

5.2.4. Using the test data and the 200-word report, the student will modify the product model design accordingly.

Task 5.3 Drawing

Using the modified product design, the student will, within three instructional periods, draw a set of working drawings for one or two of the product components showing sizes, relationships, and conventions. Enablers 5.3.1, 5.3.2, 5.3.3, and 5.3.4 relate to drawing practices.

CREDIT SYSTEM

Norm-referenced grading systems (A,B,C,D, etc.) are not compatible with criterion-referenced assessment. Other ways of recognizing student achievement must be devised. The Division of Vocational and Technical Education at Florida International University is using the following designations for recognition of performance.

CR-Credit:	Awarded when a student meets the criteria specified for the course within the enrollment quarter.
NC-No Credit:	Recorded at the end of the enrollment quarter when criteria for the course have not been met. When the criteria are met, NC will be changed to CR.
HCR-Honors Credit:	Awarded for quality performance beyond the specified criteria for CR Credit during the enrollment quarter.

Any student may elect to earn HCR credit by complying with the following criteria:

1. Meet all course criteria for CR credit within the enrollment quarter.
2. Develop a module for his own achievement in an area of interest which is related to one of the tasks or enablers in any of the course modules. The module must contain an introduction, goal, task, enablers, and resources.
3. Present the module to the course instructor for approval. Mechanics: typed on 8-1/2-inch paper, maximum of four (4) pages.
4. The task(s) of the module must be achieved within the same enrollment quarter. HCR credit will not be awarded for work achieved after the official university calendar end-of-quarter date.
5. The quality of the work must exhibit the conditions of: considered thought, logic, and command over the subject. Instructors reserve the right to elect not to award HCR credit when the work presented does not meet the above conditions.

INDIVIDUALIZED INSTRUCTION

Individualized instruction is an arrangement that makes it possible for each student to learn those things most appropriate to himself as an individual. The purpose is to maximize student learning by the adaptation of instruction in accordance with the individual differences of the student. At the present time, we are developing capability for independent study which allows the student to pursue and develop prescribed competencies at his own pace. Independent study is but one element in individualizing instruction. The following are some of the characteristics of an individualized learning process.

1. Specific performance objectives are stated in clear and precise behavioral terms.
2. The activity in the classroom and laboratory is on learning rather than teaching.
3. Faculty perceive themselves as diagnosticians and facilitators of learning.
4. Classes are small groups.
5. Multi-sensory instructional media are available to students.
6. Students are engaged in activity at their own rate.
7. Flexible scheduling facilitates seminars and independent study.
8. Criterion-referenced assessment determines student progress and performance.

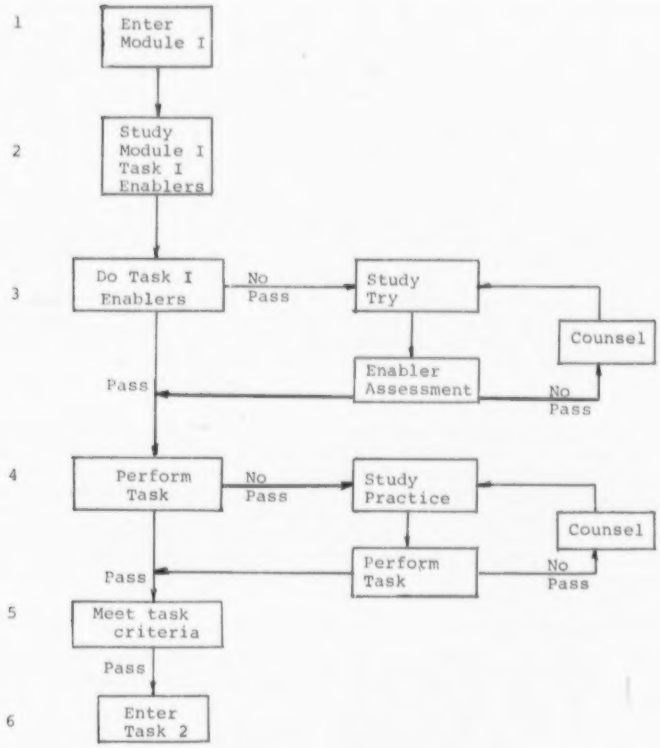

1
2
3
4
5
6
Enter Module I
Study Module I Task I Enablers
Do Task I Enablers
No Pass
Study Try
Counsel
Enabler Assessment
No Pass
Pass
Perform Task
No Pass
Study Practice
Counsel
Perform Task
No Pass
Pass
Meet task criteria
Pass
Enter Task 2

Fig. 4. Flow Diagram of Trainee's Achievement Path

The advantages of individualized instruction are readily apparent as related to flexibility, motivation, personalized attention, reduction in student categorization, pacing, reduction of failures, and recognition of student talent.

In our initial year of operation, we are concentrating on a self-pacing component, individualized learning resource options; and an assessment component that allows for diagnosis and prescription. Figure 4 is a flow diagram describing the trainee's path for achievement.

The module format allows the student to achieve at his own rate within reasonable time constraints. The enablers state what must be done and the level of proficiency or mastery. The student cannot proceed to a task until the instructor has assessment evidence of his enabling performance. Pertinent demonstrations and discussions are presented as the need arises. In the event the student does not pass enabling criteria, he is counseled and he tries again. When a student achieves the enablers, he performs the task. In the event the student does not meet the task criteria, his performance is diagnosed and treatment is prescribed. When the student meets the task criteria, he enters the next task.

ASSESSMENT

A criterion-referenced test is one that is deliberately constructed to yield measurements that are directly interpretable in terms of specified performance standards. The criterion-referenced test is designed to measure specific performance when compared to a set of criteria. Criterion-referenced tests may measure cognitive, affective, or psychomotor capability. For the most part, enabler assessment is related to cognitive and psychomotor capability, whereas task assessment is related to cognitive, psychomotor, and affective performance. Enabler assessment may be conducted by an assessment center where the student can go to "check out" on written tests (cognitive enablers), while psychomotor enablers may be conducted in class by an instructional aide or the instructor. Task assessment is usually conducted by the instructor. During our initial year, industrial arts instructors are doing all the assessment of their students to determine how the modules, materials, course, and instructional system can be modified to increase effectiveness, efficiency, and performance.

Along with the assessment process, an information storage and retrieval system is being developed so that instructors can obtain a computer printout for any given student at any time which shows his performance status in any given course and his educational program. The information management system is a valuable instructional and program counseling tool for diagnosing, prescribing, and decision-making. Long-range follow-up studies are planned to determine if products of performance-based curriculum do in fact make a positive difference in school curriculum and instruction.

SUMMARY

In summary, the most significant difference between performance-based curriculum and norm-referenced curriculum is that performance-based curriculum is structured and delineated from the processes of a system rather than from descriptive data content. Process is the framework in a performance-based curriculum. The systems approach can serve as a useful tool in the design, implementation, and evaluation of the instructional program. Delineation of the goals show where you are trying to go, the modules show you the process for getting there, and assessment and evaluation show whether or not you arrived. The information system provides feedback for revision of any and/or all of the components of the approach.

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Programmatic Objectives for Middle School Curriculum Development in Industrial Arts

Bernard Kensky **Lewis DiNunzio** **Gary Bowman**
Chuck Benshetler **Bob Krayer**

PROGRESS IN 1970-71

In late October 1970, a concerned group of industrial arts teachers attended a meeting with the Bucks County Assistant Superintendent of Schools and representatives from the Industrial Arts Division of the Department of Education. The major purpose for the meeting was to determine if a need existed for a fresh look at the role of industrial arts in the middle school.

As a result of this initial meeting, it was decided to conduct additional sessions for researching the problem. Upon review of the related research and literature, the Committee concluded: There was a need for constructing a theoretical curriculum model for middle school pupils. Several assumptions were made at this time as a result of group interaction.

First, the middle school program should consist of educational activities which are concrete, tangible, and real for the emerging adolescent. Therefore, the industrial arts program can serve as the core for the total middle school curriculum.

Second, the learning experiences to be implemented in the middle school industrial arts program should consist of the higher level cognitive processes. Therefore, industrial arts middle school programs can be recognized as a functional discipline within the levels of analysis, synthesis, and evaluation.

The same must be stated for the affective and perceptual motor learning domains. Industrial arts operates in the highest levels within the three domains when the program is evaluated in light of the learner and the learning process.

To facilitate an objective approach to our goal of developing a Model Middle School Industrial Arts Curriculum based on the educational needs of the emerging adolescent, the Committee decided to work under no constraints or limitations (i.e., building, facility, financing, staff, present and past curricular programs).

MIDDLE SCHOOL CURRICULUM STUDY: PHILOSOPHICAL PREMISES

The middle school can be a dynamic learning environment, providing the philosophy unique to the individual pupil is meaningful and realistic. Since the success of a program is dependent upon the beliefs of individuals, the philosophical premises upon which this study is based are:

Emphasis must be on learner characteristics.

Personalized learning experiences should comprise the major part of the curriculum.

Emerging adolescent learns best from the concrete to the abstract.

Curriculum must be varied and flexible.

Learning experiences should be patterned for learner success.

Middle school environment is best suited for the learner to attain the major developmental tasks of emerging adolescence.

Consideration must be given to career awareness activities.

GOALS OF QUALITY EDUCATION

After the learner characteristics were adopted, the Committee focused on the educational goals of the middle school. Pennsylvania's Ten Goals of Quality Education emerged as our base. It then became apparent that the "What, Why, and How," questions related to the goals were to be answered and understood by the Committee.

The Quality Education Program Study (QEPS, 1970) was proposed in response to Act 299 passed by the General Assembly of Pennsylvania in 1963. This Act calls for the development of procedures which will provide school personnel with relevant data with which they can strengthen their educational programs. The Educational Testing Service of Princeton, New Jersey, recommended the Ten Goals of Quality Education for the Commonwealth.

The Pennsylvania State Board of Education adopted the following Ten Goals in 1965:

I. Self-Understanding
II. Understanding Others
III. Basic Skills
IV. Interest in School and Learning
V. Good Citizenship
VI. Good Health Habits
VII. Creativity
VIII. Vocational Development
IX. Understanding Human Accomplishment
X. Preparation for a Changing World

MODEL STRUCTURE

Education lacks a true relationship between goals, objectives, and domains of learning. A test of this is that when asked to relate subject-area content in this way, one is hard-pressed to achieve this end. Because of this, a group of interested industrial arts educators have been meeting to cope with this problem.

This technique should provide means whereby the goals, domains of learning, and content would have a level of precision to judge more adequately the curriculum best suited for middle school children.

Traditionally, industrial arts has been considered as a "dumping ground" for students not able to cope with academic subjects. It has also been said that industrial arts is not a discipline-oriented field; that skills in doing something far over-shadow the intellectual and feeling processes pupils achieve in their schooling. One will even find industrial arts located in the basement or "attached" to an end of the building. Much of what went on in the past was probably done in good faith towards meeting the needs of pupils.

While it might be fair to say that industrial arts formerly related to remedial programs for retraining individuals in adjusting to life-skills, the major trend today is to conceptualize educational programs in industrial arts by emphasizing changes related to goal-oriented behaviors. It is our belief that as a student in an industrial arts program develops a degree of skill, he progresses in the intellectual and feeling processes as well. There is an abundance of research evidence indicating that the pre- and early adolescent needs concrete experiences before presenting him with abstractions. Under this premise, it is necessary to be familiar with the details of the several taxonomies and goals of quality education. These dimensions could be used as guides in identifying relevant psychological constructs in industrial arts for a middle school curriculum.

The taxonomies and goals also provide the curriculum worker with a conceptual framework for categorizing significant behaviors of learning, as well as a guide within which test items might be constructed. Once a program begins to be implemented, its assessment of intended behaviors is essential. Behavioral changes not intended sometimes occur. Evidence of this nature should be used in devising more precise learning activities and test items related to those behaviors. In this way, a program may be evaluated more readily in terms of the designated behaviors expected of middle school children.

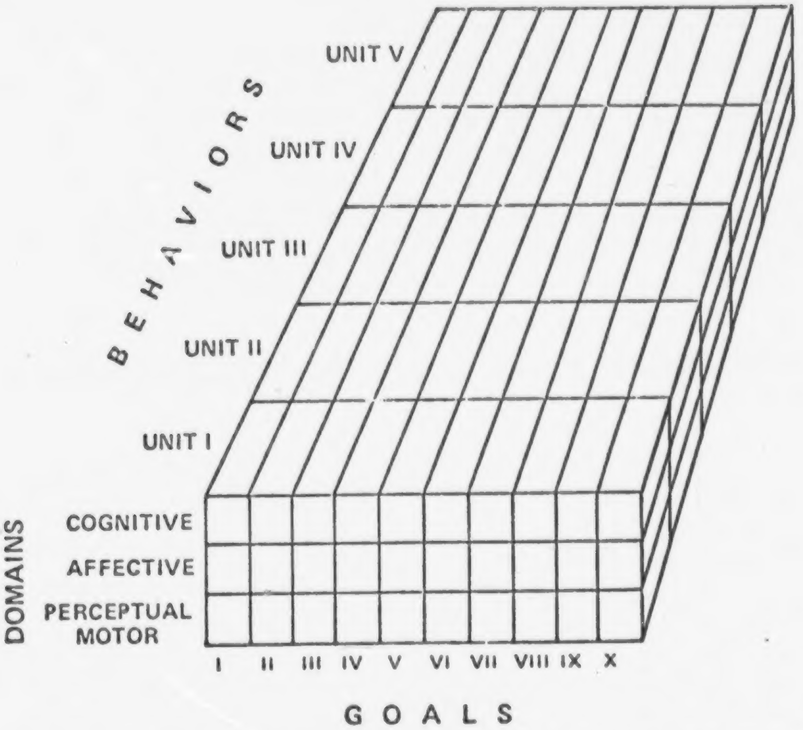
In developing a curriculum for the middle school, the Bucks County Public Schools' Industrial Arts Curriculum Committee decided to look into the problem of co-existing curricular behaviors or patterns. That is, are there common behaviors in science, math, and industrial arts common to the goals of quality education? This prompted the Committee to investigate the proper procedure in initiating some action. After much thought, the discussions led the Committee to believe that the necessary first step was to design a model. After reviewing and evaluating the more prominent curricular models available, it was decided that none completely answered our premises. Therefore, a three-dimensional paradigm (Figure 1) was constructed to include three psychological domains of learning, Pennsylvania's Ten Goals of Quality Education, and the content objectives for an Industrial Arts Middle School Curriculum.

The paradigm is considered as a potential model for organizing educational objectives in terms of functions (Goals) and identifying processes (Domains) that are relevant to life-adjustment career behaviors. This approach was selected over the conventional method of identifying and listing subject-matter skill behaviors to cover in a course.

For the first objective, the Committee decided to put meaning into each goal of quality education. The Goals of Quality Education were selected as the first dimension to the model in response to Act 299 passed in 1963 by the General Assembly of Pennsylvania. In addition, the 1971 Pennsylvania Department of Education's Standards for Approval of Secondary Programs states that, "There shall be a written body of objectives for the school which are consistent with the Ten Goals of Quality Education adopted by the State Board of Education."

Using the broadly conceived description of each goal, the Committee wrote narratives explaining the implications of each goal as it related to the industrial arts for the middle school. Content validity for each narrative was attempted during the summer of 1971. Ten groups consisting of five industrial arts educators in each group analyzed the narrative statements devised by the Committee. Using the following criteria: meaningfulness, feasibility, relatedness to the learner, attainability, and practicality, each group checked the goal description for its content validity applicable to a middle school curriculum. All goals except number ten were accepted as devised by the Committee. Goal Ten was

Figure 1. Middle school curriculum model structure.



revised to reflect the analysis submitted by the workshop participants. Thus, the first dimension of the model, product, or goals to be achieved was considered as the initial step in the development procedure.

The domains of learning (process) are psychological constructs deemed important in a school setting and thus form the second dimension of the model. Each domain is considered in its broadest sense.

The third dimension reflects the need for conceptualizing objectives of industrial arts in behavioral terms. Conceptualization would then provide the educator with a means of focusing his attention on non-cognitive domains of behavior as well as the cognitive behaviors. Such a system will provide our Committee with an overview of subject matter content which might be compared and analyzed with respect to the domains in which they purport to modify behaviors as well as the goals expected to reach quality education.

The following design for devising learning packets was used by the Bucks County Industrial Arts Middle School Curriculum Committee:

Title Block . . .
Rationale to the Pupil . . .
Performance Objectives . . .
Directions for Taking the Pre-test . . .
Pre-Requisite Skills . . .
Review Performance Objectives . . .
Do . . . .   Use . . . .   Section

Product Evaluation . . .
Directions for next activity . . .

Title Block also includes
Course -------------
Subject Area ---------
Topic --------------
Sub-Topic -----------
Grade -------------
Level --------------
Domains ------------
Code --------------

Mr. Kensky (Quakertown School District), Mr. Di Nunzio (Council Rock School District), Mr. Bowman (Bristol Twp. School District), Mr. Benshetler (Bensalem Twp. School District), and Mr. Krayer (Neshaminy School District) are members of the Bucks County Public Schools Industrial Arts Committee.

A Model for Education in the Emergent Society

Tom H. Taylor

Attempts to adapt education to continuous change have not been successful. Adaptation must, by its nature, follow technological change and resultant institutional change. Accordingly, educational plans and programs are always behind and out of gear with reality. The urban society to which education has made and is making frantic efforts to adjust is part of the institutional structure of industrialism. The Western world is beginning a transition away from the industrial society toward its successor. Urbanization was a 'solution' which the industrial society invented for its particular purposes; it is not a 'problem.' At this time, the role of education cannot be understood within the contemporary pragmatic context within which it has traditionally been conceived.

Nothing short of the generation of a completely different cognitive mode can now begin to assure even the vestiges of human freedom and dignity in a system-ized, centralizing, collectivizing and monolithic world. This presentation outlines some possibilities for attuning industrial arts to the needed re-orientation of cognitive processes. Man is now poised on the thinning edge of time. Urgent priorities in all education mandate a dramatic new role for those now involved with industrial arts. Either that role will be recognized and pursued or the program will evaporate into the oblivion of its own obsolescence.

One question has pervaded most dialogue about education during the past decade: 'Where are we going?' Numerous attempts to answer this question have been forthcoming in the form of alternate courses, classroom rearrangements, performance contracting and a host of others. Proposals of this kind have been called 'innovations.' Thus we've had during the 60's a plethora of 'innovative' programs in industrial arts, mathematics, science, social studies, and others. All of these are, however, adaptations rather than innovations, for they are made within the context of a status quo and do not change the context itself. Hence, despite the frantic spurts of the 60's, the question: 'Where are we going?' persists into the 70's.

Schools and schooling of all kinds as they are now known are part of the institutional scaffolding of industrial society. An appalling amount of educators' efforts have been going into shoring up the scaffolding, even to this time when the whole edifice itself is fast crumbling. Pre-occupation with such matters, or indeed with the symptoms of industrialism's incongruity with today's world, are not very likely to provide sorely-needed direction. To the contrary, it does violence to the whole image of education. The reality of the emerging world is far different from the myth-world of many educators. That congruity between the two be re-established is now a matter of the gravest urgency.

It now seems clear, however, that we are in transition from industrialism to yet another societal form. In the Western world, at least, we've passed through all of the stages of industrialization. In much more rapid succession, these same stages are being experienced elsewhere. In these circumstances, it is surely more appropriate to ask where we ought to be going rather than where we are going. The goal of industrialism has been to build productive capacity. That goal has been achieved in the Western world. Schools and schooling are institutional inventions of the industrial society. As this kind of society gives way to another, is it not likely that schools and schooling will be supplanted by other kinds of institutions? Myopic pre-occupation with propping up redundant appendages of industrial society is unlikely to yield answers to: 'Where are we going?', much less to the more important question: 'Where ought we to be going?'

When you're searching for bearings, it helps to climb the hill and try to discover which way you've come, and where you are. That is why I should like, at this point, to briefly retrace our cultural footsteps and to spot our position on man's tortuous way. That done, we can then perhaps find the faint outline of emergent society and suggest a role for those concerned with technology-related education.

John Diebold[1] said, almost ten years ago:

> There is a tendency to treat technological developments as awe-deserving achievements, but withal as single, disparate contributions to progress. Rarely do people have the insight to recognize today's innovations as part of a great continuum of changing society itself. But only from a long-range viewpoint can the true meaning of modern technology be grasped. As the machines of yesterday were significant because they altered the society into which they were introduced, so today's innovations will reshape modern society. Such a view will enable us not only to put today's new developments in perspective, but also to define the context in which tomorrow's technology will emerge.

Surely, it is the perspective of which Diebold spoke that we need now. How does change occur? What has changed and when? What is now likely to change? To help answer these questions, thus to acquire needed perspective, consider the paradigms in Figures 1 & 2.

Knowledge, discovered and formulated, is subsequently applied (technology) in pursuit of human purposes. As a result, the milieu of life is altered, necessitating modification of institutions. Here, technology is defined as processes by which organized knowledge is systematically applied in doing practical tasks. By institutions is meant learned ways of facilitating human/social interrelationships. Culture is all of the learned behavior of man.

Figure 1 is presented with apologies to physicists for somewhat misappropriating one of their tools, namely the vector. However, Kurt Lewin[3] got away with the same thing. It provides us here with an icon of the basic relationships of major factors in social change. Figure 1 is merely a construct developed to exemplify a set of possible relationships at any moment of time in man's long way.

Briefly, it posits that the natural sciences (capacity for coping with natural environment) "lead" and interact with human sciences (capacity for social organization), and that the resultant is effective culture that is used in pursuit of a society's goals or values.

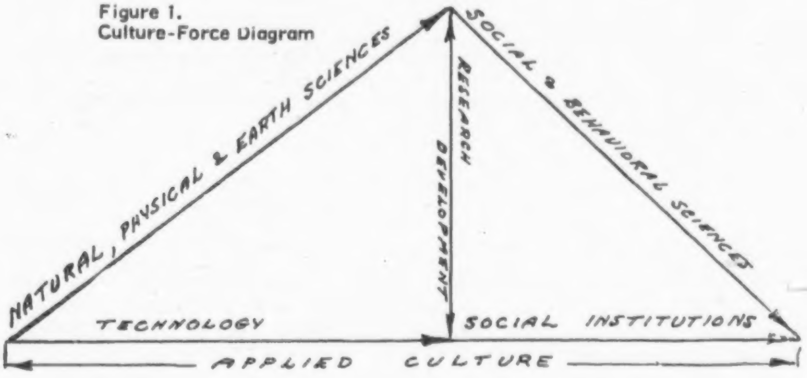


Figure 1.
Culture-Force Diagram

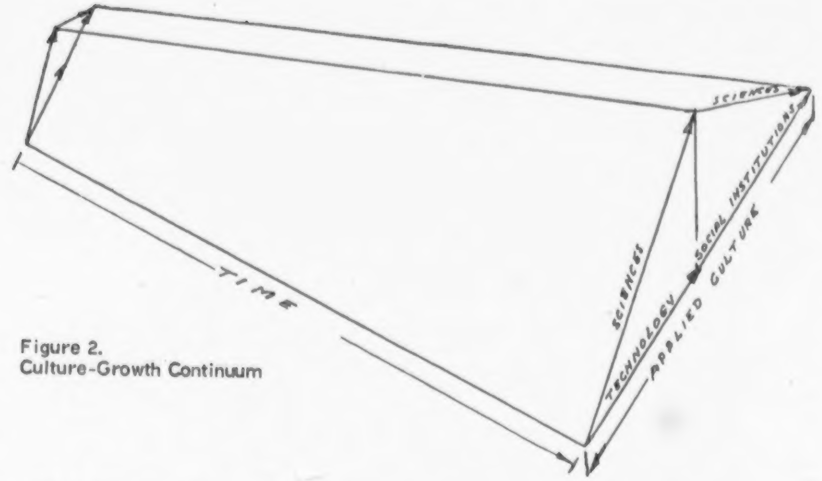


Figure 2.
Culture-Growth Continuum

Research is represented as extending either, or both, technical and institutional potential, whereas Development operates to extend the effective culture. The particular instantaneous relationships among these various factors, and particularly the goals that a given society pursues, are obviously interrelated and are, of course, determined externally to the mechanism illustrated in Figure 1, mainly by decisions which rest essentially in the realm of philosophy. Seen in time-perspective, Figure 1 becomes a cross-section of the isometric in Figure 2. The accumulated effective culture is represented by the horizontal plane in Figure 2, whereas the total scientific heritage is represented by the sum of the other two planes. Perhaps John Dewey had something like this in mind in his "experiential continuum."

Three great societal mutations have thus far evolved: 1. the goods-gathering or hunting society, 2. the goods-raising or agricultural society, and 3. the goods-making or industrial society. Major technological change has triggered each transition from an existing form to its successor. The time intervals occupied by a particular societal form and also transition from one form to the next have been successively shorter. In other words, the rate of change has continuously accelerated; this phenomenon is not, in retrospect, new. The rate has, perhaps, as noted by Toffler,[4] exceeded human capacity and inclination to adjust. And now, in Man's 800th lifetime in 50,000 years, he is in a startling accelerative transition toward what I have elsewhere called the Technostate.[5]

Figure 3 is a time-line summary of critical cultural components for the latest dozen life-times, leading up to, and including, the Great Transformation[6] that spawned industrialism and the socio-cultural circumstances of today, the springboard to the Technostate.

For a sketch of our present position, let us turn again to Toffler[7] and summarize this as follows:

1. The wheel on which individuals have to live turns faster and faster, and they have little understanding of the forces that move it and them.
2. All aspects of life, including things, human relationships, and residence, are increasingly transitory and impermanent.
3. Novelty or newness are not only inherent features of modern life, they appear to be sought after by people who seek identity in a shifting milieu; this is reflected in family dissolution and a variety of sub-cults and life-styles.

Add McLuhan's[8] thesis that the electronic age has exposed man's nerve ends to universal scraping and abrasion. Listen, as well, to Galbraith[9] as he points to the monolithic, collectivist, and comprehensive character of industrial organization — a character which inheres in any 'systems' structure designed to optimize modern technology. And people like Boulding[10] and Fuller[11] now matter-of-factly appear to accept the inevitability of yet more menacing agglomerations of influence, power, and control on a global scale.

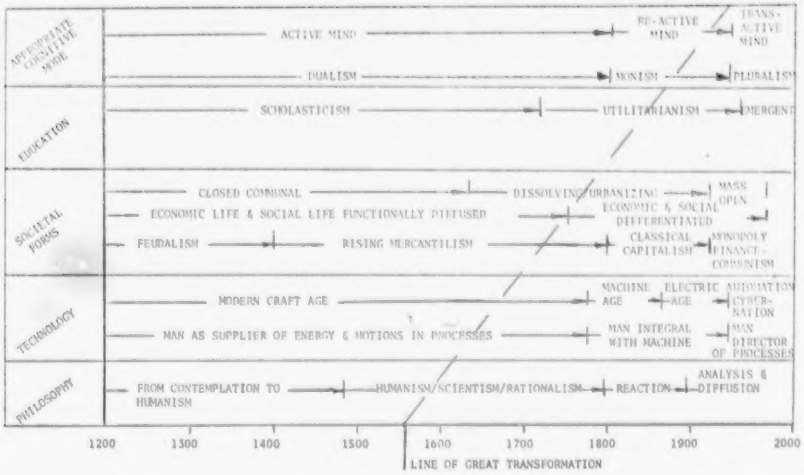

APPROPRIATE COGNITIVE MODE
ACTIVE MIND
RE-ACTIVE MIND
TRANS-ACTIVE MIND
DUALISM
MONISM
PLURALISM
EDUCATION
SCHOLASTICISM
UTILITARIANISM
EMERGENT
SOCIETAL FORMS
CLOSED COMMUNAL
DISSOLVING/URBANIZING
MASS OPEN
ECONOMIC LIFE & SOCIAL LIFE FUNCTIONALLY DIFFUSED
ECONOMIC & SOCIAL DIFFERENTIATED
FEUDALISM
RISING MERCANTILISM
CLASSICAL CAPITALISM
MONOPOLY FINANCE-COMMUNISM
TECHNOLOGY
MODERN CRAFT AGE
MACHINE AGE
ELECTRIC AGE
AUTOMATION CYBERNATION
MAN AS SUPPLIER OF ENERGY & MOTIONS IN PROCESSES
MAN INTEGRAL WITH MACHINE
MAN DIRECTOR OF PROCESSES
PHILOSOPHY
FROM CONTEMPLATION TO HUMANISM
HUMANISM/SCIENTISM/RATIONALISM
REACTION
ANALYSIS & DIFFUSION
1200
1300
1400
1500
1600
1700
1800
1900
2000
LINE OF GREAT TRANSFORMATION

FIGURE 3

In short, cultural evolution to this point in time has culminated in obliging people to move franticly about, incessantly beset by novelty and impermanence, ignorant of the nature of their involvement with this juggernaut, and lacking the capacity, perhaps even the desire, to 'get off the wheel.' Is this the impasse to which man has come along his cultural journey? Is it surprising that we hear it asked, in ever shriller terms: 'Where are we going?'

Allow me now to bring to the stand three further witnesses. The first of these is the editor of 'Hormones and Behavior,' Richard E. Whalen,[12] who presents a series of research studies on the ecology of behavior of animals. Subsequent studies relate to these influences with humans. Hormone-behavior relationships appear to show that certain kinds of a-social, even anti-social, behavior are generated by the effect of crowding and frustration on hormones. The implications of this for decadent urban conditions are evident.

Given the world's burgeoning numbers and McLuhan's thesis previously quoted, the very alarming incidence of crime and other aberrant behavior, are we in fact reducing civilization to virtual dissolution?

Secondly, hear Ellul[13] who says that, lacking human control of its implications for every aspect of life, technology has made of the world a universal concentration camp in which the individual is powerless to exert any significant influence upon his own destiny:

> Technique has progressively mastered all the elements of civilization. We have already pointed this out with regard to man's economic and intellectual activities. But man himself is overpowered by technique and becomes its object. The technique which takes man for its object thus becomes the center of society; this extraordinary event (which seems to surprise no one) is often designated as technical civilization. The terminology is exact, and we must fully grasp its importance. Technical civilization means that our civilization is constructed by technique (makes a part of civilization only what belongs to technique), for technique (in that everything in civilization must serve a technical end), and is exclusively technique (in that it excludes whatever is not technique or reduces it to technical form).
>
> Herein lies the inversion we are witnessing. Without exception in the course of history, technique belonged to a civilization and was merely a single element among a host of nontechnical activities. Today technique has taken over the whole of civilization. Certainly, technique is no longer the simple machine substitute for human labor. It has come to be the "intervention into the very substance not only of the inorganic but also of the organic."

For the third further witness, here is Medford Evans,[14] who shares Ellul's theses that in the political and economic spheres, pursuit of technology to its ultimate ends will eventuate in a monstrous, unassailable World Government:

> The symbolic capital of the quasi World Government known as the United Nations is, of course, New York. When finance capital from New York thinks of going into Russia, the idea would seem to be not to subordinate the United States to the Soviet Union (though it might turn out that way) but to subordinate the Soviet Union and the United States to the World Government. This government will rest its final authority upon a series of mergers, of which that between the U.S. and the USSR would seem to be the most important.

Is it, then, mere cynicism to say that humanity has (unwittingly for the 'average' Joe) fallen prey to what Crane Brinton[15] of Harvard has called the Religion of Progress? Faster change, staggering newness, no permanence, mammoth agglomerations of centralized power — always more and different and bigger — a riptide bearing mankind like so many chips of wood caught in the swift-running stream of events.

So when it is asked 'Where are we going?' the honest answer is that we don't know, but we're hell-bent somewhere. There are ominous signs that the destination will make 1984 look like a rose garden. In the circumstances, we'd better stop in our tracks, assess our position, seek an alternative goal, and plan at least an interim strategy for reaching it.

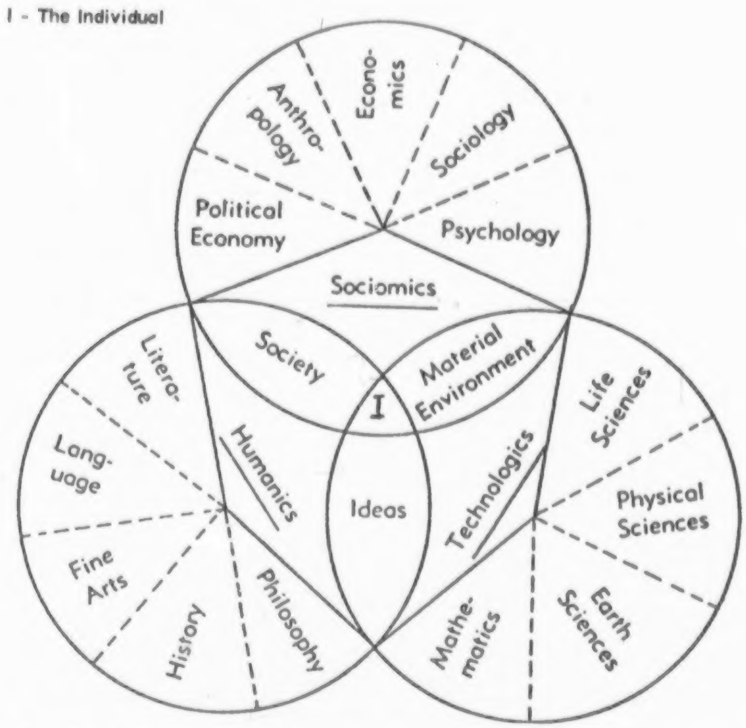
As we survey our present position, we might notice that what has passed for education is appallingly inadequate for enabling people to comprehend and cope with the really important issues. John Wilkinson of the Center for Study of Democratic Institutions observed some ten years ago: "Since men are unwilling to acknowledge their demotion to the status of joyous robots, and since they demand justification for their individual and collective acts as never before in history, it is easy to understand why the modern intellectuals (and their forcing-house, the university) have become veritable machines for the invention of new myths and the propagation of old ones." In a recent article called "The Shape of Things as They Really Are,"[16] the author includes among contemporary myths: 1. The notion that significant events are now influenced by elections, 2. the notion that consumers influence the market, 3. the unemployment 'problem.' These 'problems,' he asserts, are not problems but solutions which industrial society has applied to real problems. About the urban 'problem,' upon which your convention theme is centered, he says: "Consider the urban 'problem.' Obviously, this cliche refers to an amalgam of problems including welfare and crime, among others. The amalgamated urban problem is personified by the impacting of hordes of black and off-white people in ratty, lousy, congested housing in major cities. This is not a 'problem,' either. It is our solution to where to stash the human beings this society regards as superfluous or useless and unfit to rub up against the nice genteel people who do fit into the economic machine (or its governmental appurtenances). Were this actually perceived as a problem, this fantastically rational society would have been solving it. But the urban problem has been getting worse for 25 years. An observer who observes it without a veil of sentiment can see that, barring changes in the actual world, the destiny of superfluous Americans is to be contained indefinitely in the cities where an ever-expanding force of police will hold them in check and keep them under expanding surveillance."

Why this obsession with myths and failure to confront reality? I suggest to you that it is directly traceable to schooling which is unrelated to the actual world, which confronts students with an academic smorgasbord of unrelated and compartmented 'subjects.' This in no way generates cope-ability for life in the systems-dominated, all-at-once environment; to the contrary, it unconditions students for such a milieu, for they cannot put their fragments of learning together.

In his short but excellent article in AV Communications Review, R. J. McBeath[17] of Hawaii University explained that thought modes have now to be transformed. Thought-patterns that were appropriate for the craft era were not appropriate for the machine-age. Moreover, machine-age thought modes don't fit a cybernation, systems, space age. Today, it's the pluralistic, transactive mind that can cope with diversity and change and put things together and perceive interrelationships and trends. It's that kind of mind that differentiates myths from reality, symptoms from causes. It's that kind of mind that grasps and integrates significant components and avoids pre-occupation with myopic detail. And it's that kind of mind that education worthy of these critical times must be generating.

Three perduring entities run through the history of human existence in continuing interaction. The first of these is Ideas (philosophy) — about man and his universe. The second in man's confrontation with natural forces in maintaining his existence. The third is man's relationship to others — society. Though the specific ideas change, though the form of social structures change, the three basic entities remain. They form a stable and enduring basis for the curriculum for educating citizens. There emerges a "tri-ordinate" curriculum with three subject-areas: (1) HUMANICS, or the study of the ends and the aesthetic dimension of life, being supported by a unified investigation of the humanities and the arts. (2) TECHNOLOGICS, providing understanding of the means by which man achieves practical tasks, being supported by a unified exploration of the natural sciences and mathematics. (3) SOCIOMICS, a study of society or the institutional structure, embracing and supported by a unified study of the human and behavioral sciences.

Figure 4. THE TRI-ORDINATE CURRICULUM


I - The Individual
Anthropology
Economics
Sociology
Political Economy
Psychology
Sociomics
Society
Material Environment
I
Literature
Language
Humanics
Ideas
Technologics
Life Sciences
Physical Sciences
Fine Arts
History
Philosophy
Mathematics
Earth Sciences

In everyday life, the citizen confronts all disciplines through environment. Through the modern material environment, he contacts applications of natural sciences, not as science but as technology. Through the social environment, he is involved with behavior and human relationships, but as social institutions and not as social or behavioral science. Through the contemporary issues of his time, the citizen confronts a welter of ideas that, followed up, lead to the humanities. His human nature impels aesthetic expression in a galaxy of forms and through many media, provided, as now, he is not stultified by early conditioning to the contrary. It is surely the purpose of education to lead from involvement in the insistent present to awareness and understanding of its full meaning. That little such understanding is now an outcome of the process called education is evident.

The individual leaves school, not as a functioning citizen of the Technostate, but as a social and economic illiterate. It is not his fault: the process produces the wrong product. Moreover, to superimpose a guidance system tends to obscure the fundamental inadequacy of the educational process as it now exists. Does in fact such a system not tend to perpetuate prostitution of the educational system to nineteenth century concepts? Since the products (or victims) of the existing educational process appear to require the ever-increasing attention of counsellors, is it not time to investigate the process rather than to provide more elaborate ways of palliating its outcome?

How ineffective it is to confront the citizen head-on with science, rather than to lead him to explore it via the technology, is demonstrated by the disappointing results with P.S.S.C. physics in the United States. Just now the more appropriate approach is being fashioned by a group of technologists under the National Science Foundation.[18] And how ironic that in less than a decade after the American people (and evidently the people of Canada) were 'sold' on the remedy for American technological obsolescence in the form of P.S.S.C. physics, the Russians take another step five years ahead of us by putting a capsule on Venus! Worse still, enrollment in science courses in the high schools of America has steadily declined! Let's stop shining up the bits and pieces of an out-moded curricular structure and rebuild a 'system' consonant with the facts of life in the Technostate. Through his relationships with others, through the social institutions that facilitate these relationships, the individual citizen contacts the human and social sciences. Why not, therefore, make these points of contact the central foci of education in the secondary school?

All the disciplines that relate to each of the three major foci then become rich explicatory resources contributing to a unity of thought — to an integrated pattern with beauty and symmetry and meaning. Yet it is not until the individual sees the harmony and interrelatedness of the three major areas themselves, of Humanics and Technologics and Sociomics, that the great drama of life and of human experience in all its exciting proportions opens before him. For it is the dynamic interplay of the three entities represented by the three subject-areas of the "tri-ordinate" curriculum which have generated man's story, which are molding his present world, and which will fashion his tomorrow. From such a curriculum, the individual acquires a unity and a perspective conferring a balanced and confident mastery of his life-space by which, in turn, he is impelled to render appropriate and sensible tribute to Caesar and due homage to God. Anything short of this in the citizen's education today will depose him from the mainstream of life and make of him the cultural deprivate of tomorrow.

Of particular concern here is the sector which we have called Technologics. This is defined as a discipline relating to technology and its social, economic, and political implications. Technology is seen as that part of the cultural heritage which consists of processes for applying organized knowledge to doing practical tasks. Alternatively, technology might be regarded as a series of extensions and elaborations of man's innate capacities. We have only begun to explore the implications for man of thus expanding his being to build an environment that, in turn, reflects back on man himself.

In Saskatchewan, however, we are doing a pilot-run with quite a transactive approach to the technical aspects of technology. It is called the Integrated Processes Plan, being an holistic approach to providing comprehension of technology. It is based on taxonomies of the two major sectors: Energy and Materials. The four major uses of each of these resource media are:

A. Energy: communicating, conditioning environments, supplying mechanical motion, and working materials.
B. Materials: communicating, enclosing and protecting, supporting and carrying, and supplying nutrition.

The basic concept of our plan is 'Process.' Just as the cell is the basic unit of living things, so the process is the basic unit of technology. We have developed a general model for 'Process' which is shown in Figure 5. This may be understood by first considering materials processes, then energy processes and then abstracting the general model. In either materials or energy processes, there is the primary input — the medium to be changed, the secondary input or directions about the kind of change to be produced, and a third input which we have called the effector input. These three inputs are combined in the process to produce the output. The effector input in each case is always energy; it serves to change either molecular or atomic arrangement, whether working with energy or materials. It does not become part of the output.

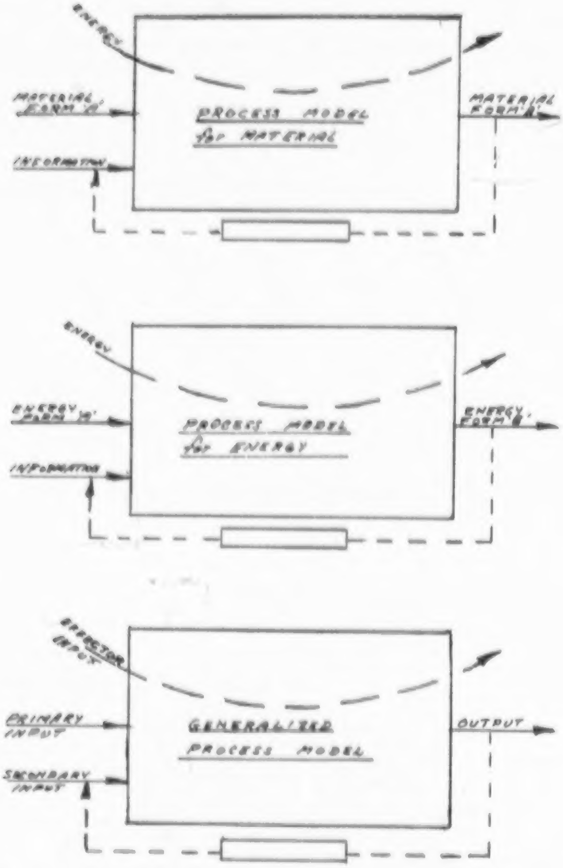

ENERGY
MATERIAL, FORM 'A'
INFORMATION
PROCESS MODEL for MATERIAL
MATERIAL FORM 'B'
ENERGY
ENERGY, FORM 'A'
INFORMATION
PROCESS MODEL for ENERGY
ENERGY, FORM 'B'
EFFECTOR INPUT
PRIMARY INPUT
SECONDARY INPUT
GENERALIZED PROCESS MODEL
OUTPUT

FIG. 5 : The ANATOMY of PROCESS

Figures 6 and 6A represent panel boards that we've built for use in the laboratory and around which laboratory experiences are centered. Each of the boards is headed by an array of a partial taxonomy of technology. Underneath the heading are channels running horizontally into which illustrative cards may be placed. Particular products exemplifying the major purposes of technology are chosen and a set of cards illustrating process stages for each outcome or product developed. Thus, an extensive array of outcomes may be related to the taxonomy by placing appropriate cards in the channels. The full-size boards are 4 feet wide and 16 feet long and have four channels. There is one board for materials and one for energy.

We are contemplating a third panel which will facilitate the study of human involvement (Ergonomics-related) in manipulating technical processes.

The plan aims to encourage and develop transactive thought modes by involving students in studying both energy and materials processes in systems to achieve projected outcomes. The laboratory is used to provide concrete experiences with a range of typical selected processes that embrace the whole gamut of energy and materials technology as employed in serving the four types of purposes previously mentioned for each sector.

FIG. 6: MATERIALS SYSTEMS PANEL

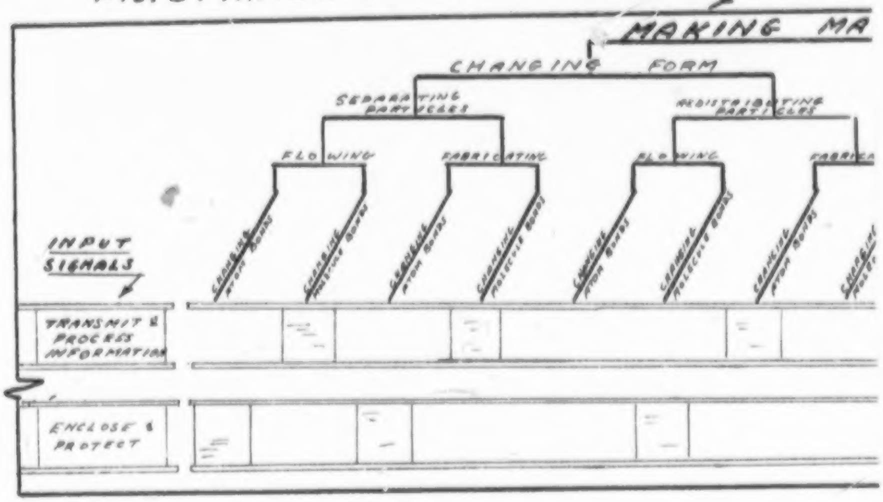
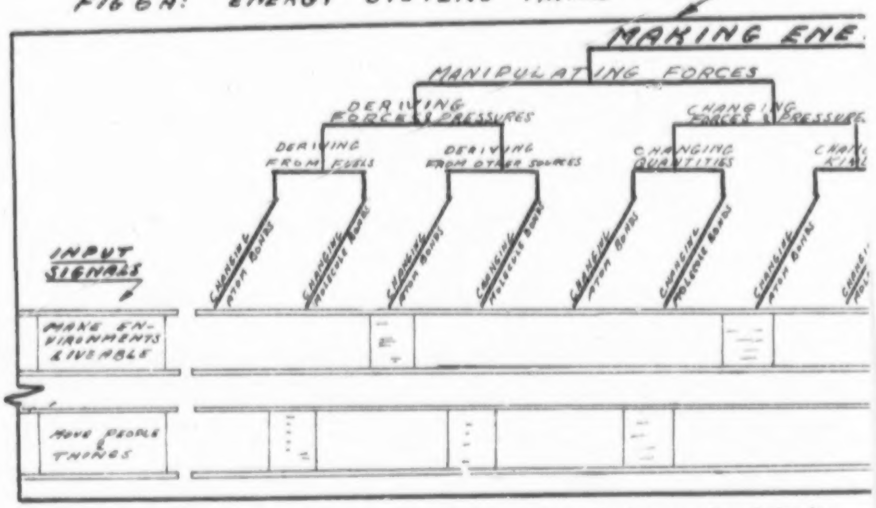
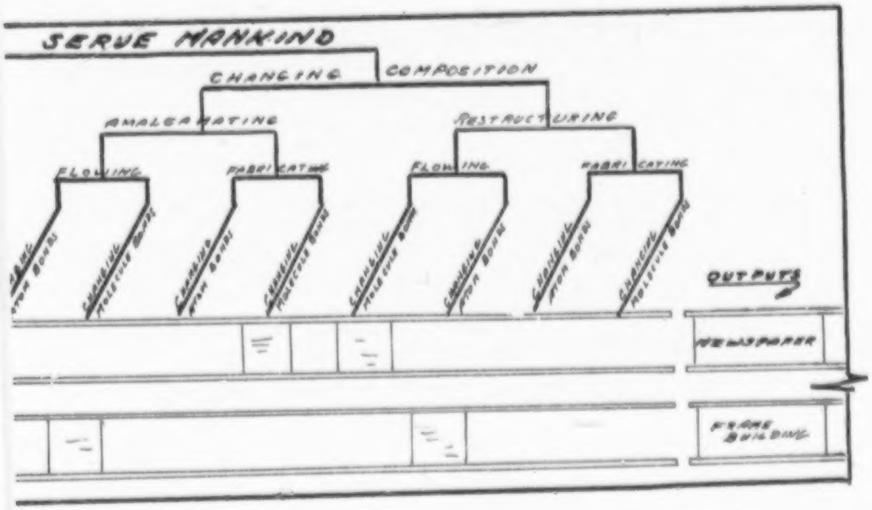
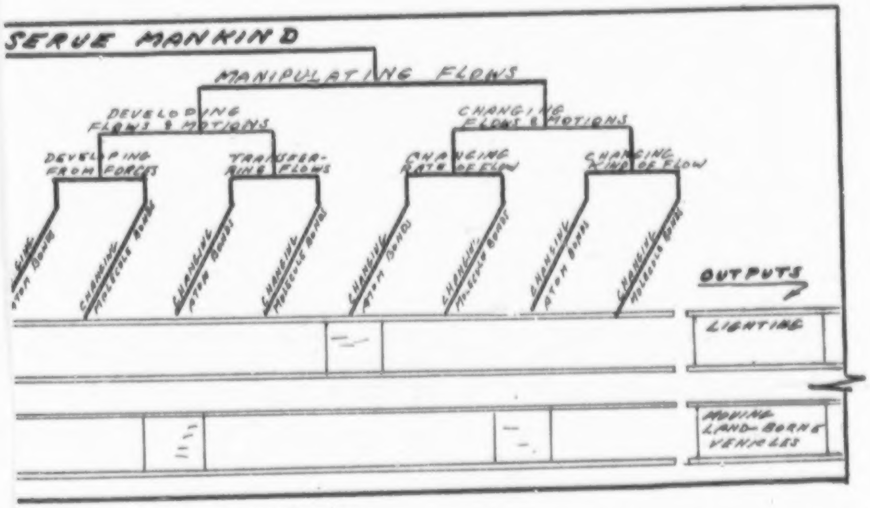

MAKING MA
CHANGING FORM
SEPARATING PARTICLES
REDISTRIBUTING PARTICLES
FLOWING
FABRICATING
FLOWING
FABRICA
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
INPUT SIGNALS
TRANSMIT & PROCESS INFORMATION
ENCLOSE & PROTECT

FIG 6A: ENERGY SYSTEMS PANEL


MAKING ENE
MANIPULATING FORCES
DERIVING FORCES & PRESSURES
CHANGING FORCES & PRESSURES
DERIVING FROM FUELS
DERIVING FROM OTHER SOURCES
CHANGING QUANTITIES
CHANG KIN
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
INPUT SIGNALS
MAKE ENVIRONMENTS LIVEABLE
MOVE PEOPLE & THINGS

In this critical hour of man's way, it should be evident to all educators that theirs is an awesome and compelling responsibility. No small part of the task falls upon those who are in positions to dispel the apalling and dangerous technological illiteracy which schooling has bequeathed to society. Particularly menacing is the utter vacuum which has been left with regard to the profound social and political consequences of technology. Two possible alternatives appear from our present vantage point. The first is to drift along; the second is to forthrightly formulate and institute plans which develop thought and action modes essential to the maintenance of human freedom and dignity in a world which now


SERVE MANKIND
CHANGING COMPOSITION
AMALGAMATING
RESTRUCTURING
FLOWING
FABRICATING
FLOWING
FABRICATING
ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
OUTPUTS
NEWSPAPER
FRAME BUILDING


SERVE MANKIND
MANIPULATING FLOWS
DEVELOPING FLOWS & MOTIONS
CHANGING FLOWS & MOTIONS
DEVELOPING FROM FORCES
TRANSFERRING FLOWS
CHANGING RATE OF FLOW
CHANGING KIND OF FLOW
ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
CHANGING ATOM BONDS
CHANGING MOLECULE BONDS
OUTPUTS
LIGHTING
MOVING LAND-BORNE VEHICLES

holds ominous prospects for these.

In Saskatchewan, we've begun to move. Our curriculum committees for industrial arts and vocational education have recommended that all technology-related courses be integrated into a holistic approach. It has been further recommended to the provincial Department of Education that both the names industrial arts and vocational education be no longer applied to the public school program. I have given some some of our thinking about the Integrated Processes Plan. How about you?

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Alaska
ELLESMERE
YUKON TERRITORY
Whitehorse
NORTHWEST TERRITORIES
BRITISH COLUMBIA
Prince Rupert
ALBERTA
SASK
MANITOBA
ONTARIO
QUEBEC
NEWFOUND
Edmonton
Saskatoon
Calgary
Regina
Winnipeg
Victoria
Vancouver
Sault Ste Marie
Montreal
Ottawa
Toronto
Quebec
Fredericton
NB
PEI
Charlottetown
Halifax
NOVA SCOTIA
0
500
1000 MILES
N

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ENVIRONMENT

Environmental Education

Frank L. Maraviglia

Today, concern for the environment is like the flag and love — everyone is for it. But just being for something is not enough. Those of you who are here or reading this paper should champion the cause in light of the threat to our ecological balance.

My presentation, as it involves environmental education, falls into three major categories: first, what presently constitutes environmental education in most people's minds; second, my personal views for a workable solution to environmental problems; and third, what part we as individuals play in solving environmental problems and furthering environmental education.

Before I continue, let me define outdoor education, conservation, and environmental education. I shall use the definitions that were presented at the 17th Annual National Conservation Education Association Conference. First, outdoor education is a method of teaching wherein established disciplines, topics, and understandings which can best be taught outdoors are taught outdoors. Secondly, conservation education is the study of man's intelligent use of his natural environment through the development, management, preservation, and renewal of natural resources for his material, cultural, and aesthetic needs to benefit present and future generations. Thirdly, environmental education is the study of all things surrounding man which affect his existence and is aimed at developing an informed citizenry, motivated to the recognition of problems and to collective action for solution.

The first concern that arises in most people's minds is the deterioration of our environment. This deterioration, whether it be air, water, soil, noise, thermal, visual, radiation, population, whatever, seems to be the general view that most people have toward environmental education when it is mentioned. These same people are looking to solve these environmental problems or ills with the same elements that caused them to exist in the first place. This solution, the "technology ethic" as I call it, is supposed to resolve all of man's problems. Why is this so?

To illustrate my point, I would like to go back as far as the 1920's. The decade of the twenties was a time when people were recovering from a war, industry was good, jobs were plentiful, business was good, the country estate or retreat was in vogue, and the era of good times permeated.

Then came the crash of the stock market and a way of life. The decade of the thirties was an attempt to recover from the depression. It was at this time the American people sought out its government for aid to help solve their problems. The WPA, the CCC, national and state parks, and road construction were the impetus in providing opportunities for jobs in order for the American people to survive. This was a departure from our American way of life. How many people remember the radical "Townsend Plan"?

The decade of the forties saw us in another war and the recovery from it. Everyone was a worker, including women, and technology played a very important part in the winning of the war. We could produce cars one day and tanks the next, or vice versa. Henry Kaiser could gear his production of liberty ships to one each day. Weapons of war were built bigger and better than before. Because of the war, the American people were pressed into the recycling movement: newspapers, returnable bottles, rags, saving of fats, and salvaging metals were the order of the day. The people not only reacted to the need, but they had a feeling, and I emphasize the word "feeling," of one's doing his share to win the war. Before the end of the decade, we were introduced to the atomic age and the jet plane.

The decade of the fifties was what I call the institutional era. We constructed more schools, colleges, hospitals, and highways than ever before. We could mold the earth as we saw fit. We became so sophisticated that we no longer called war war but a Korean conflict.

The decade of the sixties ushered in the space age. When President Kennedy stated that we would have a man on the moon by the end of the decade, he set the tone for that era. The youth movement, the idea that technology could and would solve all of our problems, was manifested — i.e., heart transplants, machines to handle people without kidneys, the computer, travel to the moon and back (a nice place to visit, but who wants to live there), polio and other diseases were conquered, etc. We went from one to two of everything — two cars, two homes, two TV sets, etc., besides luxury items that were not conceived before this time. We had reached the point where economic and technological sophistication enabled man to control his physical environment completely. But this reliance on technology and the American faith in the quick fix produced some of the worst environmental problems that beset man. The using up of our natural resources, that more is better, the quicker we get there is better, and progress was more important, were all part of the technology impetus that led us to believe that these problems, generated by man's use of technology, could also be solved through technology. It is ironic that the problems caused by technology are really the by-products of our efforts to promote the general welfare of our society.

Dr. Jerome D. Frank, in the "Journal of Social Issues," has stated that "our history of incredible inventiveness has fostered the belief that some new technological invention can always be devised to correct the evils created by the last one, without causing anyone too much cost or inconvenience. No doubt, new inventions will be required to help combat new dangers, and all of the diseases created by technology have partial technological antidotes. But, right now, we have the technique to sharply reduce such evils as air and water pollution, if only we could apply them, and the most efficient way to relieve many other dangers would be through modifying the behavior of people, not machines."[1] It must be clearly understood that, as teachers of industrial arts or industrial education, you have had a significant part in, or were instrumental in, this "technological ethic."

I see the decade of the seventies as the environmental or ecological awareness era. If we do not get a hold on some solutions to the many and varied environmental problems, we may not make it to "2000 A.D." If we do, it will not be the quality of life that we have envisioned. And lastly, the decade of the eighties, which I label as the Quality of Life. This decade will be devoted to the improvement of man, his social life, and his behavior toward not only his fellow man but, more importantly, his natural resources.

An industrialist may understand the engineering detail, the costs, and the environmental consequences of installing or not installing an electrostatic precipitator, but what determines or motivates him to install or not install it? Legal penalties; image of self and company and, in turn, personal or corporate success; cost of installing the device; these are all very tangible reward-penalty motivators. But what about a feeling that it is morally right for him to install the device; a sense of personal or corporate responsibility to society in the long-run; a desire to be "on the side of good" and equated as "with" the environmental movement?

These, too, are motivators, despite their intangible nature. And I propose that these motivators hold their own rewards. If this is true, we should not shy away from using this kind of appeals just as positively as we use economics and litigation to achieve our environmental objective.

The second category is that I consider environmental education more of a social problem than technological. I, for one, do not believe that environmental problems are going to be solved by just more technology or using technology. I have admitted that technology will have a part, but it will be effective only when more people become sensitive or develop an awareness of our spaceship earth and the relationship of man and his environment.

There is no greater awareness of man and his dependence or relationship to his environment than when an astronaut leaves this earth and must carry all of the supports of life with him.

Because this is a social issue, there are two ways that man might resolve these environmental problems. The first approach is to assume that people can be taught to change their habits. Have you tried to stop smoking? The second approach is to assume that people need not, or will not, change and, instead, their environment must be altered. Some examples of these are: Connecticut was able to reduce the accident rate in that state when it began to enforce the laws against speeding and drunken driving. Cafeterias were able to sell more desserts when they were placed first in the line of food displays. Normally, we think of eating desserts and placing them at the end of the meal, but you don't sell desserts this way. Smorgasbords place their main dish at the end of the line. There usually isn't enough room by that time to take a large helping. In each of these cases, the person's attitude was not changed, but his environment was, and so he behaved differently. The present approach in dealing with people is to do the first, but so far it has proved unsuccessful because solving social problems by changing people is less productive than accepting people as they are and changing their circumstances or environment. This is what I think we must do if we are to have an effective change toward our environment. This involves changing one's environment so that either the clues preceding a behavior or the immediate consequence of it are changed. If we want to save trees, we could put a premium on used paper and make it inviting to use recycled paper through lower cost, image to a company, etc., but more important than saving trees is that recycling is the best solution to the ever-growing solid waste problem. If we, the public, made it possible (accepted or felt the need) to recycle materials (alter our environment), then recycling will be a major contribution to solving some of our environmental problems. This will not only make our resources last longer but will give us additional space.

While behavior is based on cognitions, it is also usually dependent upon situational conditions, social habits, and attitudes. What I have been emphasizing is that just knowing the fact (cognitive) that automobiles pollute is not enough. What is important is the feeling — how people react toward the problem and how a person feels toward another person. This is really the apex to solving environmental problems, if man is to live in harmony and with respect for his natural environment. Although man is part of the ecological chain, man must begin to FEEL that part and transmit this awareness in public, government, private organization, as well as acting as a citizen to promote environmental education. Man must inform and make others aware of all the environmental concerns, not only to others but to himself.

The advent of the four-day week will help crystallize some of these feelings because of man's desire to get close to nature. Recreation or leisure time activities will play an important part in our way of life before the end of this decade. It is the nature of the animal in man to want to be close to the natural environment.

George Ash, Jr., in a letter to the editor of "Change" magazine, wrote:

> The major questions of American society are no longer technical questions but rather normative (i.e., value and moral) questions. While one can concede that technology can accomplish almost any task, we cannot answer the questions which face us because they are not technical but moral/value questions. Thus, academia, as society, is faced with the question—'What should we do with our technological advances?' This means that moral/value questions must be answered satisfactorily![2]

I believe that, for the first time in the history of mankind, we can conclude that the chief danger to human survival comes from man himself instead of the forces of nature. This reminds me of the cartoon character Pogo, who so aptly put it: "We have met the enemy and he is us." We must demand of ourselves the same high quality we demand of the environment. To say that we can change people's attitudes or alter their environment so that they can feel differently toward this environmental exploitation is very difficult because the overriding values are highly resistant to change, but we must do it. We ourselves must not only learn to cope with change, but we must influence others through teaching and example, because our environment around us is in constant flux. We must teach how to solve problems — the whole process itself — with less emphasis on the facts and less developing of technical skills. The solutions to our environmental problems require considerations of social implications. We must examine each environmental question that comes to mind in what is "ethically and esthetically correct, as well as what is economically expedient. An action is correct only when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."[3]

Barbara Ward, British economist and author, has stated:

> All activities of man take place in two environments: one is the social and moral environment; and the other is the natural environment. We have the stewardship of this incredibly beautiful planet and, on the other hand, the destiny of our fellow man.[4]

Now is the time for the people who talk about pollution to join the people who do things about pollution. This third part of the presentation is concerned with what YOU can do to make environmental awareness part of your everyday living, as well as what you might do in the classroom. Although there is nothing wrong with our environment, it is the mismanagement of our natural resources by man and man's behavior that have caused our environmental problems, and the solution must be with people and their attitudes to their part in the ecosystem if we are to survive.

The home, school, and other human institutions working together can bring about attitudinal changes that we need if we are to make it to the 21st Century with quality.

To consider building motivation into our education, we must consider the domains of cognitive behavior and affective behavior. But more, we must look at them together as what I call "attitude-cognitions." People don't say to themselves, "this is cognitive and this is affective." Rather, understandings, feelings, and action tendencies become indistinguishably interrelated to form a behavioral system. These components are independent.

The social actions of the individual reflect his attitudes—enduring systems of positive and negative evaluations, emotional feelings, and pro or con action tendencies with respect to social objects. An individual can only have attitudes with respect to those objects or things which exist in his psychological world. Hence, if you are talking clean air and your audience has never ventured out from under their urban blanket of smog, your first task is to make "clean air" a part of that audience's psychological world.

As you design instruction for attitude-cognitions – I'm using my term which says we have to consider both in terms of ultimate behavioral change – I think it will help if you accept at least three components:

1. The cognitive component. This has to do with the beliefs of the individual about the object or subject. Probably the most critical cognitions are evaluative beliefs.
2. The feeling (affective) component. This is that sticky element of emotion that is connected with the object or subject. Don't forget, both you and your audience probably have some very deep-seated emotions about environmental issues. All is fair in love, war, and environmental education – I just made that up. Emotional loading can be a potent motivator!
3. The third component of attitude-cognitions to consider is the action tendency component. This has to do with behavioral readiness.

Each of these three components – cognitive component, feeling component, and action tendency component – can vary in intensity and multiplexity. Each of us has a host of attitudes. Some are heavily emotional with minimal cognitive content. Others are intellectualized – heavy on the cognitive and feelings components, but lacking orientation as to direction. In the brief time this morning, I cannot go any further. My whole purpose has been to encourage you to take a careful look at the interrelatedness of attitudes and cognitions and to make use of this interrelatedness as you communicate – whether it's with one individual or by TV to thousands. You are the face of the decade. Actually, you are the face of the whole governmental effort to enhance the environment. Your conscious efforts to foster both information transferred and favorable attitudes are the most important part of your job.

Whereas we have exponential growth rates in population, industrialization and consumption of energy are causes for alarm. We tend to overlook the exponential growth rate in the "ecosystem awareness," and that may be our one reason for hope.[5]

The following "nuts and bolts" suggestions are only a partial list that you can add to for the improvement of our environment:

RESEARCH AND TECHNOLOGY

1. Identify pollutants that require investigation.
2. Air, water (streams, lakes, oceans), pesticides, animals, thermal, metals, and chemical waste pollution and solid waste disposal must be carried on, not only in these areas but others as well. Results of this on-going research must be communicated.
3. Better methods utilizing reclaimed fibers.
4. On the use of salt in snow states and its contamination.
5. Utilizing solid waste materials and curbing of some materials.
6. Seek better ways to reduce oil spills damage.
7. Must improve environmental monitoring.
8. Must identify pollution problems.
9. Must provide data to define and establish standards.
10. Must provide data and evaluate pollution abatement programs.
11. Must provide scientifically valid evidence that will stand up in court.
12. Must provide the instruments for assessing the pollutants.
13. Must provide a less pollutant transportation vehicle.

(Additional information concerning this topic may be obtained by contacting the U.S. Environmental Protection Agency.)

LEGISLATION

1. We as individuals should support laws and the legislators who will help improve the quality of our environment.

2. Environmental quality must be approached on a regional basis because of the complex interrelationship of governmental jurisdictions in a region.

3. Government must work with industry, but laws, regulations, and codes must be enforced without discrimination. Local, county, and state government should tolerate no "pollution havens."

4. Proclaim anti-litter month. In Syracuse, New York, we have an "improve your neighborhood" month each spring. Special weeks or months proclaimed by government officials could aid in the environmental awareness movement.

INDIVIDUAL/GROUP PARTICIPATION

1. Newspaper might run a series of pictures, as some have, under the caption "the eyesore of the week" which might shame individuals or companies.

2. Volunteer your time and yourself to those groups that will make this world a better place for all of us.

3. Promote anti-pollution.

4. Teach your children not to litter; set an example by ignoring pesticides in favor of natural pest control, mulches, and natural fertilizers to control weeds. Change to phosphate-free detergents. Buy only beverages in returnable bottles, etc.

5. Citizen action. An individual may initiate a civil suit to enjoin any person, including any federal, state, or local government or agency, who is alleged to be violating any prohibition, limitation, criterion, or permit established or issued under the Marine Protection, Research, and Sanctuaries Act of 1972 (Ocean Dumping).[6]

6. Plant something green each year: trees, gardens, etc.

EDUCATION

1. State and public colleges should play a significant role in establishing programs of environmental education that lead to environmental awareness.

2. Non-major courses should be offered in environmental education to all future teachers.

3. Graduate courses, workshops, in-service training, educational conferences such as this one, should provide programs relative to environmental education. Again, less on skills and more stress on values should be taught.

4. Elementary grades through high school should establish environmental education as an integrated part of their curriculums.

5. Assess all aspects of environmental education programs currently in progress.

6. Increased use of gaming, simulations, and role playing of environmental concerns could be utilized in our schools' programs.

7. I.A. automotive classes could set up a program to test emission control.

8. Provide films — A.V. materials on environmental education — not only to schools but to the public as well.

9. As teachers of industrial arts education, environmental awareness should be part and parcel of each course instruction.

10. We must destroy the myth, or as I label it the "technological ethic," that technology alone can solve all environmental problems.

11. We must close the circle and use both the cognitive and affective elements if we are to have an effective environmental education program.

12. We need to apply the synergistic approach to our environmental education program.

In closing, I would like to quote a paragraph from Charles A. Reich's book, The Greening of America (which, incidentally, was reviewed in the AIAA Journal along with Future Shock) that sums up my view on environmental education.

> There is a revolution coming. It will not be like revolutions of the past. It will originate with the individual and with culture, and it will change the political structure only as its final act. It will not require violence to succeed, and it cannot be successfully resisted by violence. It is now spreading with amazing rapidity, and already our laws, institutions, and social structures are changing in consequence. It promises a higher reason, a more human community, and a new and liberated individual. Its ultimate creation will be a new and enduring wholeness and beauty—a renewed relationship of man to himself, to other men, to society, to nature, and to the land.[7]

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Environmental Education: Implications for Industrial Arts

Donald P. Lauda

> It was a fish! A sausage, a thing calling itself a frankfurter, filled with fish! . . . It gave me the feeling that I'd bitten into the modern world and discovered what it was really made of . . . Everything slick and streamlined, everything made out of something else. Celluloid rubber, chromium steel everywhere, arc lamps blazing all night, glass roofs over your head, no vegetation left, everything cemented over.
>
> —George Bowling, late 1930's

It is so fantastically ironic that persons such as Bowling and others described our fate decades, and even centuries, ago and we did not take the time to listen. In 1272, Edward I banned smoke-producing coal in London and issued the death penalty for offenders. Historians will recall John Evelyn's Fumifugium, which was written as a result of the failure of London to maintain this decree. Ten years have slipped by since Rachel Carson's Silent Spring attempted to arouse our consciousness. In spite of these stout-hearted efforts, society continues to tolerate the bureaucratically-protected and economically-entrenched causes of a deteriorating environment.

Finally, in 1970, we moved from remorse to commitment in this country when the President signed the National Environmental Policy Act (NEPA). During the years preceding this act, the environment was resisted, endured, adjusted to, exploited, and placated by special interest groups. But why the sudden urge for environmental quality? Why the plea for Environmental Education from such astute groups as the EPA and USOE? One only has to look at the exponential growth of technology for his answer. Pascal, the 17th century French philosopher and mathematician, amused children with his description of rapid growth. He had them imagine a large pond of water with one lily which doubles in size each day. On the first day the plant is only one-five-hundred-thirty-seven millionth the area of the pond. At this point, there is plenty of time to trim the plant to stop its growth. If you wait ten days, the plant is less than one-millionth the size of the pond's surface. At this point, we have 99.9% of the pond open and biologically healthy. On the 25th day, the lily is still only one-thirty-second the size of the pond. The final explosion is incredible. The progression is from one-sixteenth to one-eighth to one-fourth and finally to one-half on the 29th day. We now have one day in which to restore the living balance of the pond.

The same law of exponentiality applies to other forms of life. The lemmings, for example, populate under the frozen tundra and periodically race to the sea in order to maintain balance. The deadly progression of exponential growth has killed many lakes, over-populated our cities, and created the creature comforts, the demands for which have progressed to the point where they and the technology for producing them have reached the 20th day, or is it the 29th day?

Last month, Senator Gaylord Nelson (p. 33) placed matters in perspective when he stated:

> The environment has become a worldwide issue not because of some politician's rhetoric or as a diversion from other grave human concerns, but because a deteriorating environment greatly intensifies almost every problem faced by man. And, in addressing the issue, nothing less is involved than rethinking our role and our responsibilities on the planet, as we once rethought earth's place in the cosmos during the Copernician Revolution.

Between this 1973 convention and the 1974 meeting in Seattle, the progression will continue to explode as we:

Dispose of six pounds of waste per person per day
Throw away 100 million tires
Throw away 7 million autos
Litter the landscape with 1,300 pieces per mile
Pay $4-1/2 billion for door-to-door trash pick-up
Increase our population by another 2%
Pour 200 million people into our national parks
Watch as 1,000 communities outgrow their sewage plants
Dump 500,000 compounds into the environment
Spend $165 million via the EPA
Spend 36% of the dollar on national defense and 1% on natural resources and another 1% on education
Increase global economic growth by 4%
Increase industrial facility investment by 10.2%

Each of us could add to this list without too much difficulty. And each of us will tolerate this degradation without too much difficulty. And, surprisingly, each of us could make a substantial contribution in solving many of these ecological problems through our daily routine, but more importantly, through our function as teachers.

As industrial arts teachers, we can be in a position to help if we are only willing to realign ourselves with curriculum efforts that represent the reality of the world. Each year the request for relevancy is heard from students and some teachers, but still we cling to "education for the past." Our reliance is due in part to our lack of understanding of a technological environment and its mandates. However, the young people now in our classrooms will have to face up to the 29th day if we are not willing to give them a monistic view of our technological society. James A. Swan (pp. 223-229) has stated that students need to be knowledgeable about their environment, aware of solutions to problems, and motivated to solve them. He emphasizes that man is inseparable from the problems of our society. It is likely that the legitimacy of the environment as a high-priority educational issue is more attributable to human decisions and their two components — information and values. To discuss our technical world without discussing values is sheer suicide for our young people.

Research done in Boulder, Colorado, has shown that persons with a liberal socio-political outlook are more concerned about environmental issues (Tognacci, pp. 73-86). The degree of concern expressed by young people in this study revealed that their educational level also played an important role in their values. We cannot expect to capitalize on such data if we continue to isolate students from socio-political issues in our classes. The construction of a cedar chest will not contribute significantly to a student's understanding of what his environment is, will be, or could be. If we are not willing to contribute the other side of the coin of technological literacy, the socio-political side, our students will have no choice but to acquiesce to the system or to look for relevancy in other curriculum areas.

It is very easy for us to rationalize that it is up to the biological sciences to talk about the environment. This takes the onus off our back...or so it seems. If the interpretation of industry and technology is our fundamental thrust, we are directly involved with environmental concerns, not just by coincidence. The last statement made concerning events that will occur during the next year was that industrial facility investment will increase by 10.2%. William Ruckleshaus (p. 6) identified the results of this growth. He said :

> At this high rate, capacity would double every seven years. Thus, if pollution control technology is 85% effective in existing plants, it will be just 70% as effective in cutting gross pollution tonnages seven years from now when production of everything, including contaminants, has doubled, and only 40% as effective seven years thence, when it has doubled again. After three successive seven-year doublings, the actual amount of pollution is 120% more than it was 21 years earlier before abatement began, even assuming pollution control at a remarkable 85% effectiveness level all along.

Even though we are shifting to a services-oriented society from a heavy-goods society, this exponential growth will require almost perfect abatement technology to assure us just an adequate level of amenity and health, let alone the high standard we might prefer. What does this mean for our proclivity towards demonstrating mass production techniques for the purpose of understanding efficiency without regard for our values or our right to life? Are we to assume that other disciplines will automatically fill this void, or just might we work together on a multidisciplinary program? It was not too long ago that the British government locked their windows and soaked their curtains in disinfectant rather than passing legislation. Is this our answer also?

It does not take a great deal of effort to cite examples in each of our hallowed areas of industrial arts in which we could incorporate environmental education. Please allow me to give examples in one of these to make my point. Does it matter that:

We do throw away those 100 million tires each year: might they be recycled?

We do throw away 7 million autos each year. Is it important to discuss solutions such as the one offered in one city in Mississippi where 300 autos will be shredded daily?

3.3 million metric tons or 2/3 of the oil in the world's waters come from used motor and industrial oil. (100,000 metric tons come from ship accidents.)

There are so many autos in San Francisco that 30 tons of hydrocarbons are placed into the atmosphere daily while the autos are being filled. This 66-year-old enterprise is finally under attack.

The trucks that refill the gas station supply of gasoline result in another 45 tons of hydrocarbons entering the atmosphere daily.

Autos have been banned from downtown in over 70 European cities. Is it time to discuss mass transit systems rather than tearing down lawn mower engines and family autos?

Is it important that the EPA granted Lears Motors $900,000 to develop a Ransine engine?

What about the February 15 deadline for the big cities to report to the EPA on transportation strategy?

OFFICE OF ENVIRONMENTAL EDUCATION

Environmental education programs have appeared in many forms during the past few years. The EPA, through its field offices, provides us with materials for our use as well as do other groups, such as the Sierra Club, among others. But the main responsibility for raising the public's "environmental literacy," as U.S. Commissioner of Education Sidney Marland puts it, falls squarely on the shoulders of the USOE through its Office of Environmental Education.

Walter Bogan, the new director, states that his office has three basic functions (Environmental Science and Safety, p. 18). Number one is its grant-making activity. In fiscal 1972, the Office of Environmental Education awarded $3.4 million for 170 projects. Number two, the office makes resource materials available for the public; number three, it offers technical assistance in educational matters where possible.

According to Bogan (p. 19), his office now wants to pull together a number of packages of workable programs, curricula, and the like, and aid in making these programs work by making them available to people with particular expertise. This will focus on particular programs rather than continuing to fund experimental programs across the board. It appears that his department will favor joint programs with other federal and state offices. Of course, the usual budgetary restraints will effect future grants. Since President Nixon felt that $4 million was inflationary, the budget for the fiscal year has been reduced to $3 million, which is less than it was in 1972.

AIAA TAKES ACTION

The literature in industrial arts during the past ten years does not reveal many attempts to deal with environmental issues. Any models that were written were fuzzy in content or imprecisely stated. Unfortunately, it appears that our discipline has accepted growth as preordained and has been willing to watch conflict between the goals of subsystems and the welfare of broader systems. However, we probably cannot blame ourselves, since the growth spurt of technology has placed our entire society into an unprecedented situation. The convention proceedings of the past will reveal that only in the past few years have we been willing to state that human life has value in terms of its meaningful relationships. It was these concepts that led the American Industrial Arts Association into action.

In 1971, the Curriculum Committee of the AIAA addressed itself to the topic of environmental education. In the fall, an ad hoc committee was appointed to investigate the role of the association. The three-man committee immediately recognized the necessity for the involvement of industrial arts teachers in environmental education. The report submitted to the Executive Committee in the spring expressed a need for education at all levels, including that for teacher educators; the necessity for federal funding of pilot programs; more publications in our journals, as well as speakers at state and national meetings.

As a result of this preliminary effort, the committee was retained with a broadened membership, including representation from all seven regions of the United States. As of this date, the committee has nine members, including membership from the secondary level and teacher education. At the January 1973 meeting of the Executive Committee of the AIAA, the ad hoc committee was made a permanent unit under the Elementary Education section of the AIAA.

In order to assist teachers in the field, the committee is currently preparing a publication which is devoted solely to environmental education. This monograph will include:

Introduction (written by William Ruckleshaus, Director of the Environmental Protection Agency)
The Environment as a System
Rationale for Study in Industrial Arts
Examples of On-Going Programs
Sources of Funding
Careers
Resources (Bibliography, Films, and Resource Agencies)

The monograph will be published by the AIAA and should be available this fall.

The future of this committee and the AIAA's role in environmental education relies upon a concerted effort on the part of all of us. A phenomenal amount of expertise is available within our own ranks, and we hope to capitalize on this knowledge and experience. Input may be directed to the committee member in your region or directly to Dr. Donald P. Lauda, who is chairman.

> . . . we are that strange, culture-bound animal whose biological drive for survival expresses itself generationally.
>
> —Theodore Roszak

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A Report on Environmental Education's Success

Ray Douglas Loyd

A multitude of environmental education programs have been developed and tested nation-wide. The programs were often hastily prepared to meet the relatively sudden demand placed upon the field of education. They were designed to help alleviate the environmental problems facing society. Though many of these programs were unique in materials and methods, they shared the same goals and objectives. Almost all of the programs had a major objective of developing environmental awareness. Totally, the programs have had immeasurable success in developing environmental awareness.

An experimental program at the fourth grade level developed and tested for a doctorate degree at Texas A&M University is one of the "successful" programs. A principal objective of the A&M program was to: "Develop a student guidebook on the man-made environment to introduce the basic concepts important to developing environmental awareness."[1] Using the concept that the man-made environment caused the environmental problems and also provides the only possible solutions to the problems, the guidebook was based upon information and material obtained from many sources.

The development, testing, and evaluation was conducted with methods indicative of most doctoral research. Books, booklets, pamphlets, brochures, and other printed paraphernalia were used in obtaining information. A rough draft of the guidebook was followed by a series of preliminary sketches to help illustrate many concepts. The finished guidebook consisted of eight chapters, 152 pages, with 121 colored illustrations. Each illustration was photographed for slide presentations.

Following a brief introduction directed toward the students, the first chapter presented an explanation of the environment and its implications for man. Chapters two through five covered the environments of primitive man, ancient man, medieval man, and modern man, respectively. The last three chapters were devoted to the present situation of the man-made environment in relation to current environmental problems and their solutions.

The guidebook material was presented to fourth grade students for testing with the use of photographic slides. The presentations proved successful in attaining the objective of developing environmental awareness. Illustrated in Figure 1 are the results of a comparison between the control group and the test group scores on evaluative opinionnaires. The students in the test group exhibited a statistically significant gain from the pre-test to the post-test in the mean rating score of 7.8%.

The success of this small experiment is illustrative of most environmental education programs. Environmental awareness is being developed, and society is concerned about environmental quality. This "concern" is expressed by thousands of environmentalists through enthusiastic and dynamic orations, as well as sincere and voluminous writings. The environmentalists have contributed greatly to environmental education's success in developing environmental awareness.

With so much success, the end to seeking new and better materials, methods, and programs seems imminent. The success is deceptive. There is no end now and will be no end in the near future. Upon a thorough examination, environmental education's success can be compared to the American Cancer Society's campaign against cigarette smoking. People are "aware" of the health hazards in cigarette smoking, but this "awareness" has not convinced people to stop their deadly habits. Like the habitual smoker, the "environmentally aware" public has made only a token contribution to solving their problem. To convert this apathetic awareness into directed action should be the major objective of all environmental education programs. The value of all knowledge can only be measured by the results obtained from its use. Industrial arts is in an ideal

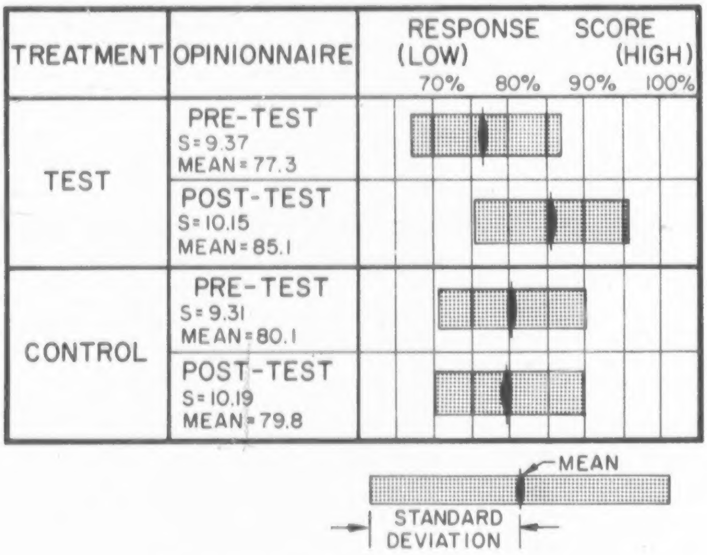

Figure 1. Mean response score comparison by treatment.

situation to promote innovative environmental education programs that produce valuable results.

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Air-Land Pollution in the Environment

Leslie V. Hawkins

During the first half of this century, many studies were conducted to identify and understand the living environmental hazards. These studies produced a concern for what is known as preventive medicine. Much progress has been made to eliminate such scourges as yellow fever, malaria, and diphtheria. In contrast, it has been only in recent years that mankind has become concerned with the non-living hazards which can cause accidental death, injuries or disabilities, or tremendous economic losses. Previously our philosophy has been that these were the result of "acts of God" and nothing could be done about them. We now recognize that most of these are caused by error in human judgment. If we can reduce the human judgment error, we can improve this ecological concept.

Man's success with eradicating the biological hazards has left him in apathy toward physical hazards and their inter-relationships. The growth of technology and social behavior has raised the price of physical hazards so that they no longer can be ignored.

At the beginning of the twentieth century, there came upon the American scene a device which first was considered a rich man's toy — the automobile. Today it is the poor man's necessity. This machine has completely changed our environment and the social patterns under which we live. At first, society tried to ignore it and provided no controls whatsoever. As a result, we have a patch-work of regulations which have developed piecemeal and are quite ineffective. This device has polluted the air, scarred our landscape, and claimed our lives.

This presentation is addressed to the problems created by the vehicles powered with internal combustion engines. This machine, which has been in our midst approximately 70 years, has been a tremendous blessing to mankind in providing an economical source of rapid transit. It also has been a curse in expanding the effects of human emotions and errors.

The latest year for which complete records[1] are available, there were approximately 56 thousand people killed within the United States by automobile accidents. Usually it is not pointed out that 12 thousand survivors generally die within the year as a result of these accidents. Another 12 thousand victims become as vegetables because of them and have to be cared for the rest of their lives instead of becoming useful citizens. This makes a total cost in lives of 70 thousand people — men, women and children — lost to society each year. This is more people than live in a county such as Brazos County, Texas. In addition to the 70 thousand referred to previously, 4 million are injured. These accidents cost from 12 to 14 billion dollars annually. This economic loss from the automobile would make a tremendous impact upon our national debt. For the approximately one hundred million drivers, the cost per individual for these accidents would amount to about $140.

It is time for us to begin to alter the relationship between the physical environment of man and this machine. To overcome any problem, we must first understand its cause. A few years ago a major energy company had a slogan "Let us put a tiger in your tank." We must recognize and cope with this "tiger" in our midst. We are told that many years ago in India when a tiger invaded a community, the residents would band together to drive him out. This is what we are going to have to do if we are going to survive — band together to control this beast in our midst. Most of us do not have this "tiger" in our sight, much less by the tail.

Examine the damaged vehicles in a salvage yard of your city or community and you will begin to comprehend the immensity of the problem. This examination will indicate not only the economic loss, but also the injuries and heartaches. Multiply your findings by 4 million accidents annually and you begin to "get the picture."

For many years, industrial arts has had as one of its major objectives the teaching of consumer knowledge. This objective involves the intelligent purchase and use of consumer goods and products. We certainly have failed with this objective when applied to the automobile. Its exhaust fumes pollute the air; its noise disturbs the environment; its wrecked and abandoned bodies or discarded parts mar the landscape; and it contributes to the loss in human lives and in the economy. No one is advocating elimination of our modern modes of transportation, but they are advocating controls. Many of the problems created by the internal combustion engine — more specifically, the automobile — are brought about by a lack of understanding of the natural laws which govern it. When we ignore the laws of physics and nature, we are a menace to everyone, including ourselves.

One of the physical laws involved is the coefficient of friction — the relationship of speed with the mechanical condition (e.g., brakes) of the vehicle and the road surface. Stopping distance is increased on a wet surface in direct relationship between the three elements pointed out previously — speed, condition of vehicle, and condition of road surface. Trying to stop on a wet surface produces the same effect as increasing the speed on a dry surface.

Another area in which we need to be more knowledgeable is reaction time — the time necessary to recognize a situation and react to it. The reaction time for the average driver is three-fourths of a second. The greater the speed, the greater the distance covered during the reaction time.

The natural laws also affect such driving factors as sight distance, steering control, and stopping distance. Snow storms, fogs, rain, blowing dust or smoke, as well as darkness reduce the distance ahead which can be seen clearly. Ice, water, and snow on the roadway and bridges affect the steering control and increase the stopping distance. All of these may or may not be encountered on any one single trip or journey, but all are a factor at one time or another, and then the speed and trip distance must be adjusted accordingly.

Following the crash of a vehicle into another object (the primary crash), a second crash takes place within a few hundredths of a second. This secondary crash is caused by an object within the vehicle coming into contact with a fixed object blocking its path, such as the instrument panel, the windshield, or the steering wheel. It is during the secondary crash that the human body receives its injuries unless it is properly restrained or "cushioned."

Since 1966, government regulations require that safety belts be placed in the automobile for use by its occupants, and yet surveys show that only 20% to 30% of these wear the safety belts[2] and only 3% to 5% wear the shoulder harness. The National Safety Council states that 10 to 15 thousand lives a year could be saved if 100% of all occupants wore restraining devices. Since about 1968, automobile manufacturers have been required to install the shoulder harness. Conduct your own survey and observe the number of occupants wearing the shoulder harness during one trip through town. Only occasionally is one observed in use. Yet these same individuals would not think of shipping a treasured article across town by placing it in a cardboard or metal box without sufficient restraining material or padding around it and securely fastened. These are the same individuals who will ship their most precious cargo — their children and themselves — across town in a metal box with no restraining devices in use or the doors securely locked.

Considerably more research is needed on passive restraining devices such as inflatable bags, automatic restraining belts, helmets, nets and pads, or retractable shock absorbers, before they will be installed in all vehicles. These items are being tested to determine how effective they would be in reducing the energy reaching the occupant during a crash. Other features which have been developed, and some have already been installed to protect the occupants, are a modified contact surface, such as rounded corners to soften the edges, and cushioning on the parts with which the individual comes in contact. The recessed steering wheel and the collapsible steering wheel have been installed in many models.[3]

There are many areas in which improvements are needed in the over-all engineering design. These include a stronger passenger compartment, controlled energy absorption, and a more extensive monitoring system to alert the driver of conditions developing within the vehicle. Some of the latter already in use are the indicators for oil pressure and the fuel supply. Others which would be useful are air pressure in tires, wheel alignment, faulty steering or braking, and coefficient of friction between the tires and the road surface.

Since 1966, manufacturers have been required to install safety belts in all passenger vehicles, and in 1968 the shoulder harness became mandatory. There has been more consumer resistance to the use of these safety features than to any other consumer product on the market. According to Dr. D. W. Toms, Director of the National Highway Safety Bureau, in a 1970 presentation at an insurance symposium,[4] they had not been able to document a single fatality below 60 m.p.h. for persons wearing their upper and lower safety belts.

It is imperative that all drivers change their attitudes toward or become more knowledgeable about the physical forces involved in motion, as momentum, inertia, centrifugal force, and gravity.

The news media has done much to make us aware of the condition of the air over our major cities. There is no question but that the pollution contributed by the automobile is being reduced. The Environmental Protection Agency has set standards for the amount of reduction of hydrocarbons — 97% when compared with uncontrolled engines, 96% for carbon monoxide and 93% on oxides of nitrogen.[5] As of today, engines are producing 80% less hydrocarbons than the uncontrolled ones. Carbon monoxide has been reduced by 70% and oxide of nitrogen by 50%. Because of the photochemical smog, California has one of the strictest pollution laws of any state, and it is still below the national standard.

In teaching consumer knowledge, we must emphasize to our students that they should be aware of the exhaust systems on the internal combustion engine which must be properly maintained in order to keep the emission rates low. Maintenance is the key to efficient operation of any engine or motor.

We should analyze our contributions to other pollutants of the air, such as our fireplaces and heating systems which use fuel oil. These should not be eliminated, but their operation made more efficient. Any environment that endangers the national health should be improved. Those who demonstrate and chant slogans then roar away in their gasoline-powered vehicles have contributed little to the solution to the problem. Mankind will never solve all of his problems. As one problem is solved, another is created. Much effort and research is being done in an attempt to solve these problems. Even the amount of delay time at traffic lights is being considered in respect to the amount of emission from the waiting vehicles.

The impending fuel shortage and rationing may have some plus benefits if it forces the American public to use mass transportation. A few years ago, the younger generation spent considerable time pointing out the problems of our way of life. Let us hope mankind never runs out of problems to solve.

Some of the simple things that can be done to further reduce air pollution and traffic congestion are: 1. Reduce the horsepower of the engine. 2. Return to the standard transmission. 3. Stagger the work days and/or hours to distribute the high-intensity traffic over a longer period of time. 4. Encourage car pools by providing locator service, e.g., preferential parking facilities, for car pools.

Mass transit possibly is the best solution to our traffic dilemma. One bus carrying 60 people requires less space than 60 cars, each carrying one person, and bus engines can be improved to reduce the emissions. Mass transit can be encouraged by providing exclusive bus lanes, thus speeding the flow of traffic.

Land pollution can be observed around service stations, salvage yards, and landfills. Much of the waste from these is washed into our streams and lakes, killing fish, birds, and wild animals. Much of this material could be recycled and placed back into production instead of being left to pollute the water and mar the landscape. Too often the landfills and the abandoned vehicles found along our streets and countryside provide breeding grounds for rodents and insects.

Only a few of the problems connected with or the result of our modes of transportation and their effect on the environment have been touched upon. Many of these referred to will provide research for the scholars of the future, but it is going to take time, patience, dedication, and money. Then the public will need to be educated to accept the changes and the higher cost.

Economics plays a great role when a decision is reached to support these changes and hopefully improvements. For example, examine the reasoning in making the selection to purchase an automobile. Many or most of the safety features are available for all vehicles placed on the market each year, but they raise the cost. Too often the decision is reached, especially by the younger buyers, based upon the original cost, economy of operation (e.g., miles per gallon of gas), lines, color, or the "in" model and make of the day.

We — the industrial arts teachers — can make an invaluable contribution to humanity if we can bring our young students to the point they will weigh their decisions in making a purchase of and in maintaining any consumer product. We must accept this responsibility of leading them to recognize the value of weighing their decision in terms of assessing their values. Which is more important? Economy or safety? Fashion or practicality? Need or want? With knowledge and judgment, perhaps they can attain any or all of these.

FOOTNOTES

(1) Dean W. Jeffers, "Opening Remarks," Insurance Institute for Highway Safety. Proceedings of 1970 Symposium (Washington, D.C., June 1970), p. 2.

(2) N. I. Bohlin, "A Statistical Analysis of 28,000 Accident Cases with Emphasis on Occupant Restraint Value," Institute of Transportation and Traffic Engineering. 11th Stapp Car Crash Conference (Safety Society of Automotive Engineers, 485 Lexington Ave., N.Y., N.Y. 10017, 1967), p. 307.

(3) William Haddon, Jr., "What We're Talking About," Insurance Institute for Highway Safety. Proceedings of 1970 Symposium (Washington, D.C., June 1970), p. 18.

(4) Douglas W. Toms, "Address," Insurance Institute for Highway Safety. Proceedings of 1970 Symposium (Washington, D.C., June 1970), p. 172.

(5) Pamphlet: "Let's Have Clean Air — But Let's Not Throw Money Away." Chrysler Corp., Research and Editorial Services, P.O. Box 1919, Detroit, Mich., 48231), p. 2.

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M

GAMES

Developing Educational Games for Industrial Education Classes

Thomas Wright

Learning should be fun. How much better our classrooms and laboratories would be if we all accepted this concept. How much better the student's interest and achievement would be if they perceived our laboratories and classrooms as a fun place to be.

To increase the enjoyment of learning, many teachers have discovered the ancient art of game-playing as an effective teaching device. Lagemann (1968) reported, "Game-playing, once only a pastime, has become a potent fresh technique for solving problems, grasping abstract ideas, and learning by doing (p. 20)."

Games take advantage of the motivation inherent in children's love for simulation, role playing, and fantasy. A social studies teacher in a Boston suburb reported, "Before we started on games, you could watch the youngsters counting the final minutes before the bell rang, but when you have a game going, the main problem is to get the kids to stop playing (Lagemann, 1968, p. 20)."

WHAT IS A GAME?

Games are a type of simulation which presents a representation of reality in a competitive play format. Gordon (1970) defined games as "any simulated contest (play) among adversaries (players) operating under constraints (rules) for an objective (winning) (p. 8)." Games may also be seen as selected teaching-learning techniques to which the element of play has been added to increase student motivation (Wagner, Christophel, & Gilloley, 1964, p. 8).

WHAT WILL GAMES DO?

Games help fulfill many objectives in the classroom. Gordon (1970, p. 18) suggested that games increase student motivation, clarify difficult concepts and processes, help socialize the student, and integrate classes of diverse ability levels.

Another strong asset of games lies in the personal involvement afforded the students. The student is allowed to explore a system with freedom. He sees an immediate purpose in his activities. He also makes decisions about his actions and sees the results immediately in a non-threatening environment. Through games, the teacher is placed in a helper role and is seen as an assistant to the child in his effort to learn. (Derell, 1969; Inbar & Stroll, 1970)

Rogers and Kysilka (1970) summarized the effectives of games as follows:

> . . . we can look to simulation games as changing the teacher's role: reducing the discrepancy between school and "real life"; involving students as active learners; and motivating children to go beyond traditional expectations in knowledge and understanding (p. 95).

HOW ARE GAMES DESIGNED?

Many games are commercially available for traditional "academic" subjects at all levels of school. Games may be purchased for students from kindergarten to graduate levels in a wide variety of subjects, but games for industrial arts are almost nonexistent. Therefore, industrial arts teachers will need to develop skill in designing their own educational games.

The absence of games for industrial arts need not be seen as a negative force. Stark (1968) suggested "the creation, implementation, and execution of 'games' as a source in the educative process is exciting and stimulating for both students and teachers (p. 43)."

Learning from games occurs from several different phases. Abt (1967, p. 93) suggested that there are three major phases of games which must be considered: game design, game play, and game analysis.

The design process for educational games may be summarized into several major guidelines. These include (Gordon, 1970; Kelly, 1970):

1. Game purpose: Clearly state the specific educational objectives for the game.

Stark (1968) suggested, "If one is interested in questions, methods of inquiry, and possible solutions, then 'games' offer not only the opportunity to learn specific and factual material, but such learning as intuition and imagination (p. 43)."

2. Scope: Determine the scope of the game in terms of the issues to be considered and the setting in time and geographic area. Rogers and Kysilka (1970) stated games are "a selected representation of a physical and/or social phenomenon... (p. 97)." These phenomena must be selected and placed in an appropriate setting.

3. Key actors: Identify key actors in the game process, whether individuals, groups, organizations, or institutions. Towler, Montgomery, and Waid (1970) listed three questions which must be answered about the players: "Who are the players or actors? What kinds and how many are needed (p. 96)?"

4. Player goals: Define the objectives of the actors in terms of wealth, power, influence, or other rewards.

5. Player rules: Five major factors constitute the rules of the game: (A) Player Resources – the information and resources (money, men, states, etc.) each player receives; (B) Decision Rules – the procedures and criteria players use in determining courses of action; (C) Player Interaction – the sequence of play among the participants in the game; (D) Constraints – external limits on what a player may do and may not do in playing the game; and (E) Scoring – the win criteria of the game (Gordon, 1970, pp. 123-131). In discussing rules, Kelly (1970) stated, "Make the rules of the game simple and easy to understand (p. 119)."

6. Presentation: Choose the form of presentation for the game. Common forms of game presentation are discussed in the next section of this paper.

WHAT ARE THE CHARACTERISTICS OF EDUCATIONAL GAME PLAY?

The second phase of learning from games suggested by Abt was game play. Most educational games contain play characteristics more encompassing than the purely competitive type found in traditional games. Gordon (1970) wrote "... serious games are seldom pure competition where one person wins and everyone else loses. The cooperative aspect of most real-life situations is built into games, and winning is usually a relative thing (p. 8)."

Game play is based on dynamic process where many aspects can be treated simultaneously. Seldom should game play be centered on a list of facts. (Gordon, 1970, p. 134)

Game play is, in effect, dress rehearsals for adult living. Through games, the future is brought "... into the present and thrusts the youngster into situations where adult skills are needed to win (Lagemann, 1968, p. 21)."

WHAT IS GAME ANALYSIS?

Abt's third phase of learning from games is game analysis. Educational games, unlike other types of games, have a learning component. To facilitate this learning, according to Kelly (1970), the teacher should make "... use of critique at the completion of each round to "solidify" the knowledge gained (p. 119)." This critique or analysis "... is best carried out immediately after the end of a game, when interest is high (Abt, 1967, p. 118)."

WHAT ARE THE COMMON GAME FORMATS?

Game formats may be categorized into two basic groups: Role-playing games and graphic games. Role-playing games usually require a minimum of materials and are "... used primarily in games that teach processes involving much negotiation, bargaining, compromise; in general, human interaction (Gordon, 1970, p. 11)."

Graphic games are used to represent graphically the processes under study and usually require teacher- or commercially-developed materials. Phillips (1967, p. 89) listed four major types of graphic games: Bingo-type games, track games, card games, and domino games.

WHAT CRITERIA SHOULD BE USED IN EVALUATING GAMES?

All educational activities should be evaluated, and educational games are not an exception. Abt (1967) stated, "Games should be evaluated on their operability, motivational effectiveness, intellectual content, and relevance (p. 118)." To accomplish this type evaluation, Franz Armbruster, creator of the commercial game, "Instant Insanity," suggests a series of questions as a "personal criteria biased by all kinds of prejudices (Games Children Play, 1969, p. 95)."

1. Is the game fun — If it isn't fun, forget it. You might as well do the regular classroom work.
2. Are the elements of the game really those of the subject you're trying to teach? If the lesson is on Spanish phrases, a game about men in Madrid or Barcelona isn't going to help, unless it uses Spanish phrases.
3. Is the game behavior specific? In other words, does the scoring and winning depend on skill rather than luck?
4. Is the game self-perpetuating? Can a child, once taught the game, teach it to his peers?
5. Do even the losers benefit in some way — preferably by improvement in the game skill?

SUMMARY

Games show great promise for the classroom. "The "games theory" is not a panacea for all educational ills, but possibly another important tool to prepare children for life (Stark, 1968, p. 64)." Games should be viewed and used as an educational tool. If games are developed "around the things that appeal to children... they'll enjoy the game and learn something from it (Games Children Play, 1969, p. 96)."

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Occupational Games with Implications for Disadvantaged Students

Robert Hildebrandt

The following game will introduce participants to a simulated gaming effort. The reference game provides a specific example from which the discussion can proceed. Direct examples include identification of basic decisions, type of game, introduction of luck, degree of simplification, structure of the game, manipulation of opportunities, and the enthusiasm and excitement of gaming. The game includes an instruction sheet and six student profiles. The profile sheets portray students from varying backgrounds. While the analyzation of interaction between these students could act as the basis for an instructional goal, the game as used in this instance is only demonstrative.

REFERENCE GAME RULES

Purpose:

The purpose of this game is to acquaint the participants with some gaming techniques and provide common experiences for references in the following discussion. The reference to high school students is a demonstration of manipulating goals.

To Win:

The players have 50 points (pts.) to start. To win, the player must accumulate 100 pts.

Procedure:

1. The spinner will be used to determine the subject of the decisions. The decisions will be simulated by the toss of the dice.

2. The spinner will be used first by the player getting the highest score in the pregame dice toss. In case of a tie, a run-off toss will be held. After the spinner determines the subject, all six players, starting with the first to spin, will throw the dice and record their gain or loss directly on the profile sheet in the subject area. After all six players have thrown the dice for the subject area, the spinner passes one player to the left, and the process is repeated until a win is recorded.

STUDENT PROFILE

Name - Mike
- Indian American
- Lives in an Indian section of innercity area
- Has reading hardship

Points needed to
Win - 100

Subject	# Thrown	Gains or Losses	Points to Start 50
Street	2, 3, 4	Dope Bust - lose 5 pts.	
	7, 9, 10, 11	Gang Fight - lose 10 pts.	
	6, 8	Good Will Activity - gain 10 pts.	
	5, 11, 12	Occupational Activity - gain 15 pts.	
Summer Activity	7, 9	Do Nothing for the Summer - lose 10 pts.	
	6, 8, 10	Summer Job - gain 10 pts.	
	3, 4, 5, 11	Good Summer Job - gain 20 pts.	
	2, 12	Summer in Europe - gain 5 pts.	
Occupational Orientation	9, 10, 11	Vocational Training - gain 10 pts.	
	5, 6, 8	Industrial Arts Program - gain 15 pts.	
	4, 7	Career Classes - gain 5 pts.	
	2, 3, 12	Academic Subjects - lose 10 pts.	
Education	3, 4, 5, 7, 9, 11	Drop-out Before Graduation - lose 5 pts.	
	6, 8	Graduate - gain 10 pts.	
	2, 12	Graduate With Honors - gain 20 pts.	
Family	2, 12	Institutionalized - lose 5 pts.	
	3, 5, 11	Without Original Parents - gain 5 pts.	
	4, 10	Without One Parent - gain 10 pts.	
	6, 7, 8, 9	With Original Parents - gain 15 pts.	
Police Record	6, 7, 8	Convicted of a Felony - lose 5 pts.	
	5, 9	Arrested for a Misdemeanor - no gain	
	4, 10, 11	Arrested but Released Because of Pressure - gain 10	
	2, 3, 12	Clean Record - gain 20 pts.	
College	6, 7, 8	No College - lose 5 pts.	
	3, 5, 9, 11	Community College - gain 5 pts.	
	4, 10, 12	State College - gain 10 pts.	
	2	Ivy League University - gain 20 pts.	

STUDENT PROFILE

Name - Jose
- Spanish American
- Lives at poverty level in inner-city
- Above average student

Points needed to Win - 100

Subject	# Thrown	Gains or Losses	Points to Start 50
Street	2, 3, 11, 12	Dope Bust - lose 10 pts.	
	4, 6, 10	Gang Fight - lose 5 pts.	
	5, 8, 9	Good Will Activity - gain 10 pts.	
	7	Occupational Activity - gain 15 pts.	
Summer Activity	4, 6, 10	Do Nothing for the Summer - lose 10 pts.	
	5, 8, 9	Summer Job - gain 10 pts.	
	3, 7, 11	Good Summer Job - gain 15 pts.	
	2, 12	Summer in Europe - gain 5 pts.	
Occupational Orientation	4, 9, 10	Vocational Training - gain 5 pts.	
	5, 8, 9	Industrial Arts Program - gain 10 pts.	
	7, 11	Career Classes - gain 15 pts.	
	2, 3, 11, 12	Academic Subjects - lose 5 pts.	
Education	6, 7, 8	Drop-out Before Graduation - lose 5 pts.	
	4, 5, 9, 10, 11	Graduate - gain 10 pts.	
	2, 3, 12	Graduate With Honors - gain 15 pts.	
Family	2, 3, 12	Institutionalized - lose 10 pts.	
	4, 10	Without Original Parents - lose 5 pts.	
	6, 8	Without One Parent - gain 5 pts.	
	5, 7, 9, 11	With Original Parents - gain 15 pts.	
Police Record	5, 9	Convicted of a Felony - lose 15 pts.	
	6, 7	Arrested for a Misdemeanor - lose 5 pts.	
	2, 3, 8, 12	Arrested but Released Because of Pressure - gain 10	
	4, 10, 11	Clean Record - gain 15 pts.	
College	6, 7, 8, 11	No College - lose 5 pts.	
	5, 9	Community College - gain 10 pts.	
	4, 10	State College - gain 15 pts.	
	2, 3, 12	Ivy League University - gain 20 pts.	

STUDENT PROFILE

Name - Sam
- Black
- Lives around third generation welfare people
- Has scholastic ability but little interest in school

Points needed to Win - 100

Subject	# Thrown	Gains or Losses	Points to Start 50
Street	7, 5	Dope Bust - lose 5 pts.	
	6, 8, 9	Gang Fight - no gain	
	2, 3, 11, 12	Good Will Activity - gain 10 pts.	
	4, 10	Occupational Activity - gain 15 pts.	
Summer Activity	6, 7, 8	Do Nothing for the Summer - lose 5 pts.	
	3, 5, 8, 11	Summer Job - gain 10 pts.	
	4, 10	Good Summer Job - gain 15 pts.	
	2, 12	Summer in Europe - no gain	
Occupational Orientation	6, 8	Vocational Training - gain 15 pts.	
	7, 4	Industrial Arts Program - gain 10 pts.	
	5, 9, 10	Career Classes - gain 5 pts.	
	2, 3, 11, 12	Academic Subjects - lose 5 pts.	
Education	6, 7, 8, 11, 12	Drop-out Before Graduation - lose 5 pts.	
	3, 4, 5, 9, 10	Graduate - gain 10 pts.	
	2	Graduate With Honors - gain 20 pts.	
Family	4, 10, 11	Institutionalized - lose 5 pts.	
	5, 9	Without Original Parents - gain 5 pts.	
	6, 7, 8	Without One Parent - gain 10 pts.	
	2, 3, 12	With Original Parents - gain 20 pts.	
Police Record	4, 5, 10	Convicted of a Felony - lose 10 pts.	
	6, 7, 8	Arrested for a Misdemeanor - lose 5 pts.	
	9	Arrested but Released Because of Pressure - gain 10	
	2, 3, 11, 12	Clean Record - gain 20 pts.	
College	6, 7, 8	No College - no gain	
	4, 5, 9, 10	Community College - gain 10 pts.	
	3, 11, 12	State College - gain 15 pts.	
	2	Ivy League University - gain 20 pts.	

STUDENT PROFILE

Name - Al
- White
- Lives in innercity area
- Average student

Points needed to Win - 100

Subject	# Thrown	Gains or Losses	Points to Start 50
Street	2, 3, 11, 12	Dope Bust - lose 10 pts.	
	4, 10	Gang Fight - lose 5 pts.	
	6, 8	Good Will Activity - gain 5 pts.	
	5, 7, 9	Occupational Activity - gain 10 pts.	
Summer Activity	2, 3, 12	Do Nothing for the Summer - lose 10 pts.	
	6, 8, 9	Summer Job - gain 10 pts.	
	5, 7, 11	Good Summer Job - gain 15 pts.	
	4, 10	Summer in Europe - gain 5 pts.	
Occupational Orientation	5, 7, 9, 11	Vocational Training - gain 15 pts.	
	3, 6, 8	Industrial Arts Program - gain 5 pts.	
	4, 10	Career Classes - gain 10 pts.	
	2, 3, 12	Academic Subjects - lose 10 pts.	
Education	3, 4, 10, 11	Drop-out Before Graduation - lose 10 pts.	
	5, 6, 7, 8, 9	Graduate - gain 10 pts.	
	2, 12	Graduate With Honors - gain 15 pts.	
Family	2, 3, 11, 12	Institutionalized - lose 10 pts.	
	4, 5, 10	Without Original Parents - gain 5 pts.	
	6, 8	Without One Parent - gain 10 pts.	
	7, 9	With Original Parents - gain 15 pts.	
Police Record	2, 3, 11, 12	Convicted of a Felony - lose 10 pts.	
	6, 8, 9	Arrested for a Misdemeanor - lose 5 pts.	
	4, 10	Arrested but Released Because of Pressure - gain 5	
	5, 7	Clean Record - gain 15 pts.	
College	6, 7, 8	No College - lose 10 pts.	
	4, 5, 9	Community College - gain 5 pts.	
	3, 10, 11	State College - gain 10 pts.	
	2, 12	Ivy League University - gain 15 pts.	

STUDENT PROFILE

Name - Nate
- Black
- Lives in inner city area
- Superior Student

Points needed to Win - 100

Points to Start 50

Subject	# Thrown	Gains or Losses
Street	5, 9	Dope Bust - lose 15 pts.
	4, 10	Gang Fight - lose 10 pts.
	6, 7, 11, 12	Good Will Activity - gain 10 pts.
	2, 3, 8	Occupational Activity - gain 15 pts.
Summer Activity	2, 6, 12	Do Nothing for the Summer - lose 10 pts.
	3, 4, 10, 11	Summer Job - gain 5 pts.
	5, 8	Good Summer Job - gain 10 pts.
	7, 9	Summer in Europe - gain 15 pts.
Occupational Orientation	2, 3, 4, 11, 12	Vocational Training - lose 5 pts.
	5, 9, 10	Industrial Arts Program - gain 5 pts.
	7	Career Classes - gain 10 pts.
	6, 8	Academic Subjects - gain 15 pts.
Education	6, 8	Drop-out Before Graduation - lose 15 pts. and next turn
	3, 4, 7, 9	Graduate - gain 10 pts.
	2, 5, 10, 11, 12	Graduate With Honors - gain 20 pts.
Family	5, 6	Institutionalized - lose 5 pts.
	9, 10, 11	Without Original Parents - no gain
	2, 4, 8, 12	Without One Parent - gain 5 pts.
	3, 7	With Original Parents - gain 15 pts.
Police Record	2, 3, 11, 12	Convicted of a Felony - lose 15 pts.
	6, 8,10	Arrested for a Misdemeanor - lose 5 pts.
	7	Arrested but Released Because of Pressure - gain 10
	4, 5, 9	Clean Record - gain 15 pts.
College	5, 6, 7	No College - lose 15 pts.
	3, 8, 9	Community College - gain 5 pts.
	4, 10, 11	State College - gain 10 pts.
	2, 12	Ivy League University - gain 15 pts.

STUDENT PROFILE

Name - Tom
- WASP
- Lives in a $75,000 house in the suburbs
- Honor student

Points needed to Win - 100

Subject	# Thrown	Gains or Losses	Points to Start 50
Street	2, 3, 11, 12	Dope Bust - lose 15 pts. & next turn	
	4, 10	Gang Fight - lose 5 pts.	
	5, 6, 8, 9	Good Will Activity - gain 5 pts.	
	7	Occupational Activity - gain 10 pts.	
Summer Activity	4, 5, 10	Do Nothing for the Summer - lose 15 pts.	
	2, 3, 11, 12	Summer Job - gain 3 pts	
	6, 9	Good Summer Job - gain 5 pts.	
	7, 8	Summer in Europe - gain 10 pts.	
Occupational Orientation	2, 3, 12	Vocational Training - lose 10 pts.	
	4, 10	Industrial Arts Program - gain 5 pts.	
	5, 9, 11	Career Classes - gain 10 pts.	
	6, 7, 8	Academic Subjects - gain 15 pts.	
Education	2, 3, 12	Drop-out Before Graduation - lose 15 pts.	
	4, 5, 6, 8, 9, 10	Graduate - gain 5 pts.	
	7, 11	Graduate With Honors - gain 10 pts.	
Family	2, 3, 12	Institutionalized - lose 15 pts.	
	4, 10	Without Original Parents - lose 5 pts.	
	7, 11	Without One Parent - gain 5 pts.	
	5, 6, 8, 9	With Original Parents - gain 10 pts.	
Police Record	2, 3, 11, 12	Convicted of a Felony - lose 20 pts. & next turn	
	4, 10	Arrested for a Misdemeanor - no gain	
	6, 8, 9	Arrested but Released Because of Pressure - gain 5 pts.	
	5, 7	Clean Record - gain 10 pts.	
College	4, 10	No College - lose 15 pts.	
	7	Community College - no gain	
	5, 6, 8, 9	State College - gain 10 pts.	
	2, 3, 11, 12	Ivy League University - gain 15 pts.	

BUILDING GAMES

The following discussion of games is based on the author's interaction and experiences. Other discussions of game-building teahniques may be found in articles by William Gameson (1971) and Peter House (1972) in Simulation & Games. There are also several other discussions of the aspects of game building in Simulation Gaming in Learning (Boocock, 1968).

In building a suitable instructional game, the educator should select his target goal. Because of the dynamism of many games, numerous spin-off goals may be realized. The primary goal is often instructional, but secondary goals may deal with other disciplines and social or personal adjustment. In some cases, goal realization may not be clearly defined or easily measurable in comparison to traditional instruction. This may be in part due to the response variation or overly general goal areas.

When designing a game, knowledge of the participants to be served is very helpful. Although some games are very general in nature, such as Monopoly (Parker, 1935) and serve a wide range of the population, their goal is mostly entertainment, and they offer little instructional value. When building games for disadvantaged students, an understanding of their lifestyle and problems may add local relevance and individual importance. Examples of games designed to serve a specific group would include situation dramas similar to the reference game.

GAME SELECTION

With an understanding of both the goals to be achieved and the participants involved, an educator can select a game already developed or build one of his own that will fit his particular situation. There are many games for all areas of instruction already developed and tested. A compiled bibliography, "Gaming and Simulations in the Social Sciences" by Cathy S. Greenblat (1972), lists other bibliographies, directories, books, articles, papers, periodicals, newsletters, and related readings, all dealing with simulations and games. Also, many occupational games and simulations are listed in "Career Education, An Annotated Bibliography' (Baily, 1970).

If no suitable game exists, the game builder can develop a game to suit his particular needs. In developing a game, the first consideration should be the identification of basic decisions a player must make that will lead to goal fulfillment. In the reference game, all the decisions were solved by chance, but if the roll of the dice were replaced, decisions such as "what to do for the summer" would be a participant decision. The identification of decisions such as the summer activities and the possible alternatives would be fundamental game building blocks.

Although the difference between a game and a simulation is frequently a clouded issue, a game is usually considered to be a greater abstraction and usually incorporates an element of chance. Games may be of the strategy or showdown type or a combination of both. A strategy game would be one where players interfere with each others' progress (as in chess), while a showdown game compares the results (as in a race) to determine a win. The reference game is a showdown game, since the players do not interfere with each other and the number of points are compared to determine a win (Abt, 1968).

Simulations usually simplify an existing institution, but not as abstractly as a game. Combinations of simulations and games can be very effective instructional tools. In an instructional setting, a simulation can provide experiences very close to an occupational analogy. The simulated environments are one of the most effective teaching methods in several areas as shown by the NASA astronaut training and current pilot training programs. Because simulations frequently involve complex skill and judgment training, they are usually performance evaluated.

The reference game could be changed into a simulation if the participants were involved in activities simulating the lifestyle of their adopted student. Many games on the market today simulate the lifestyle of disadvantaged people in interaction with non-disadvantaged population. An example of a game of this type is Blacks & Whites (Sommer, 1971), a game that deals with real estate values.

Another consideration would be the role or extent to which the game or simulation depends on skill or judgment. One method commonly used to speed up the process of the game is to introduce a manipulator of chance. The element of chance can simulate time-consuming skill or judgment activities as in the reference game. One could also simulate these activities by simplifying them to a point where they are reduced to a simple judgment.

Other times these skills or judgment may provide more instructional content if in fact they only consist of elements of chance.

A case in point might be the disadvantaged student who has experienced a good deal of failure. He may have a need for an understanding and dramatization of a process, but often his skills at the subject are below the level of the non-disadvantaged student, placing him at an additional disadvantage. As another failure would certainly not help motivate him towards learning, at least giving him an even chance would make success easier. Seeing the game as a recreational illustration is a lighter burden since his chances are enlightened by luck. In the reference game, the success odds were approximated by computing the average gain per throw of the dice. The average gains for each student were:

Mike	5.5 pts.
Sam	3.8 pts.
Nate	4.3 pts.
José	4.0 pts.
Tom	3.8 pts.
Al	5.4 pts.

As shown in the reference game, the odds can be stacked, giving the disadvantaged or non-disadvantaged student any odds desired.

The complexity level is another factor the game builder should match to his goals and participants. The rules that govern the decisions are the method for goal achievement. If the rules are too simple, participants will overly manipulate them and may not achieve the instructional goal. Rules that are too complex will not readily provide the rewards that help motivate participants.

With the availability of computers, response analyzation can be greatly speeded up. Instead of playing against each other, players can challenge the computer. Many methods of incorporating computers into games have been developed, with important implications for occupational subjects. The computer game relationship is discussed in detail in A Primer of Gaming (Barton, 1970).

Putting all the previous considerations into a workable scheme is the final stage of developing the initial game. As in the reference game, provisions must be made for order of events, decisions, evaluation of decisions (through interaction or independently), and a method of ranking the evaluations. Checks and balances for equality (or inequality, as in the case of the reference game) should be provided.

The testing or trials of the game are essential steps in educational gaming. Most games are revised at least once, and usually several times before a final version is derived. William Gameson, author of SimSoc, discusses the revision process in his article "SimSoc, Establishing Order in a Simulated Society" (1971).

The entire process of game selection and game building is diagrammed in Figure 1.

When applying instructional and occupational games to disadvantaged students, the educator may find different acceptance of different techniques. Listed below are some observations concerning gaming efforts with disadvantaged students:

1. The manipulative element in games is similar to the manipulation in the life style of many disadvantaged students. They seem quite adapted and keenly involved.

2. Elements of chance excite them greatly. Since they infrequently "win" at traditional competitions for grades, jobs, etc., the success is welcome when it happens.

3. While interaction games appear to be the most exciting, games played against an impersonal respondent stimulate more learning. A social stratification exists on the physical level and carries through to the instructional patterns, limiting their efforts at beating each other.

4. Power, both social and physical, is a subject of great interest. Methods of acquiring and using social power for occupational or individual goals such as strikes, law suits, and hiring laws are truly involving.

In summation, the game should fit the individual participants, whether they are disadvantaged or not. Instructional gaming and simulation in the occupational areas is a natural supportive methodology because of its analogy to the competitive life style and business practice. For disadvantaged students the competition may need to be structured to limit the depression of failure. The reality and dynamics of gaming can offer involvement and enthusiasm to education.

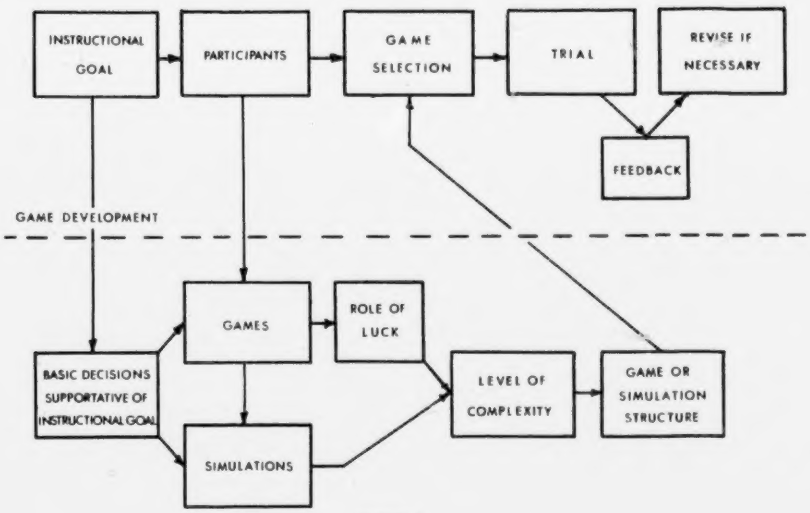
INSTRUCTIONAL GOAL
PARTICIPANTS
GAME SELECTION
TRIAL
REVISE IF NECESSARY
FEEDBACK
GAME DEVELOPMENT
GAMES
ROLE OF LUCK
BASIC DECISIONS SUPPORTATIVE OF INSTRUCTIONAL GOAL
LEVEL OF COMPLEXITY
GAME OR SIMULATION STRUCTURE
SIMULATIONS

FIGURE I

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INDIVIDUALIZED INSTRUCTION

Individualized Instruction—A Model for Reform

Adam Pfeffer

The individual learns initially through active exploration, not passive observance. Possibilities for learning are only as limited as his ability to explore. He is an uninhibited creature and uses every sense he has to see, smell, taste, touch, and hear his world.

When the child enters school, the traditional educational system promotes lock-step habits which are difficult to overcome.

"Traditional learning methods must be altered to throw a greater burden of routine knowledge dissemination on modern technology, while making faculty more available for counseling and smaller or individualized learning situations and for 'humanizing' the educational process."

A program where individualization is emphasized allows the student to progress at his own rate. In the traditional educational model, even with homogeneous grouping, there are numerous sub-groups (as many as there are children). The teacher finds himself teaching to the middle ability level.

An analogy that might make the pupil's view more comprehensivle to adults is to imaging oneself traveling across an unknown land to an unknown destination. A child knows only that all the adults in his life have decided he and the other children are to make this trip, that he has absolutely no decision in the matter, that the map is neither available nor understandable to him. Very quickly the daily life on the road becomes all-important. The stops, daily chores, demands, and inspections become the realities, rather than the trip or the destination. Children feel that what they are going to learn is far removed in time and entirely mysterious. Since what they are learning makes little sense to them, students seldom ask why. The child perceives that he is going to be taught whatever the teacher decides, so the question "why" is useless.

To make education relevant to students, it is necessary to have them actively participate in the design of curriculum. Independent study provides one way of creating this type of program. It is defined as a self-directed learning process.

Students are provided with the opportunity to pursue an idea, an experiment, a problem, or a project commensurate to their individual needs, designed and implemented by them. A number of goals pertaining to independent study are: (1) selecting an interesting topic; (2) locating information; (3) choosing goals and methods; (4) taking responsibility for learning; (5) organizing time; (6) organizing pertinent information collected; (7) analyzing and criticizing information gathered; and (8) self-evaluating.

The program under discussion is flexible in its design, yet potentially so rigid in application that it provides for children of all ability and motivational levels. There are no curriculum lines. The student must (1) accept the responsibility for facets of the learning process which are often taken care of by the teacher. (2) A student should be considered for independent study only when he has demonstrated better than average acceptance of responsibility. (3) All work must be completed outside the structure of regularly-scheduled classes and may or may not include knowledge covered in the regular curriculum. (4) Upon tentative acceptance to the independent study program, initial work would entail planning with advisors exactly what will be accomplished and what goals will be set for independent study. This is written into a contract. (5) A schedule of regular conferences must be set up with the advisors. It is the responsibility of the student to be on hand at the time of the scheduled conferences and be prepared to discuss the work he has accomplished. (6) An evaluation is made at the end of each step of the exploration. If satisfactory progress has not been shown, he may be asked to withdraw from Independent Study. (7) The student prepares a detailed report stating the findings and results of his project. This report and any physical apparatus pertaining to the project will be submitted to an Independent Study teacher on a mutually-selected date. (8) The student may elect to withdraw his project by informing an Independent Study teacher that he wishes to do so.

For school projects, advisors may be any teacher, administrator, counselor, professional staff member, or student with competence in the selected areas. Out-of-school projects may be conducted with community volunteers as advisors. The responsibility of the advisor is to consult and guide the student from the inception of the project until the final evaluation.

The administration will excuse the student from scheduled classes and activities in order to prepare the project and shall offer as full use as possible of all school facilities for the preparation of the project. The administration will also hold the student responsible for observance of all school rules and regulations during the preparation of his project.

The parent must accept full responsibility for the student's acts while engaged in any approved voluntary out-of-classroom activities that a student may choose for Independent Study.

The community also has a responsibility. It must allow students access to its organizations, facilities, and personnel so that project choices become innumerable.

> Psychologists Herbert Gerjuoy of the Human Research Organization phrases it simply: 'The new education must teach the individual how to classify and reclassify information, how to evaluate its veracity, how to change categories when necessary, how to move from the concrete to the abstract and back, how to look at problems from a new direction, how to teach himself. Tomorrow's illiterate will not be the man who can't read; he will be the man who has not learned how to learn.'[2]

An individual curriculum can assist students in learning how to learn by developing responsibility and self-direction.

FOOTNOTES

(1) Patricia McCormack, Youth Panel Lists Blueprint for Education in the "70's". (New Jersey Courier Post, June 24, 1971) 1L11,5.

(2) Alvin Toffler, Future Shock (New York, Random House, 1970) p. 367.

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Self Instruction Materials as an Educational Model

Holland E. Boaz

As a part of the Sanford Research Project, The Sanford Central High School, Sanford, North Carolina, contracted with the Educational Development Section of the RCA Service Company to prepare, during the summer of 1972, self-instructional materials in four occupational career clusters. The RCA staff consisted of four curriculum content specialists, a behavioral objective specialist, an editor-writer, and a project director. The school system provided typists and personnel for printing, collating, and stapling. They also provided personnel to develop multi-media, such as sound-slide programs, to accompany the instructional packages. The materials were developed in the high school. As the final acceptance of the materials was dependent upon the approval of the Director of Occupational Research in the school, the RCA personnel worked closely with the subject matter teachers. The total operation resembled an assembly line production, with each person serving a vital function in the process.

Upon arriving in Sanford, the curriculum content specialists and the writer-editor reviewed curricular materials consisting of books, guides, studies, pamphlets, etc., provided by the RCA project director. During this first week of intensive study of the provided materials, RCA brought in a specialist to conduct a workshop in which competencies, the behavioral objectives, and formating were discussed. As a part of this workshop, the preparation of individualized packages was begun. The first package produced by each specialist was carefully critiqued, and the responsibility and role of each person on the RCA team toward the over-all effort of preparing the individualized instruction materials was made clear.

The curriculum content specialists were responsible for the identification and delineation of career competencies, the establishment of behavioral objectives based on them, the development of individualized learning packages and unit packages, and the integration of these materials into a usable whole. The behavioral objective specialist assisted in identifying and refining the behavioral objectives. The writer-editor edited the work of the content specialists, and the project director reviewed and gave final approval to all the work.

The focus was upon developing individualized instruction materials for the occupational education programs. These materials were designed to cover the first year of instruction in the clusters of drafting, masonry, metals, and carpentry. The development of the competencies in each cluster represented a synthesis of input from five sources: the Sanford instructional staff, the state curriculum guide, the state staff, the local craft advisory committees, and the RCA curriculum content specialists.

The conceptual framework undergirding the clusters was structured upon the establishment of job-oriented career competencies. In developing a framework for the identification of these competencies, guidelines were based upon the knowledge and ability a craftsman needs in an actual job situation. Although the occupational courses of drafting, masonry, metals, and carpentry were oriented to local employment opportunities in Sanford and surrounding counties, the prepared self-instruction materials might be used in a variety of settings with a minimum of modifications for local conditions.

In the actual preparation of the individualized instruction materials, each cluster area was divided into approximately 15 units. These units were divided and sub-divided much like the table of contents in a book. The unit package consisted of a rationale; the general objectives; specific objectives, which were drawn from the individual task or competency packages; and the learning activity, which included the name of each task package within the unit. Thus, the student could determine his competency in an area through an examination of the unit package and proceed accordingly.

The task packages numbered approximately 100 per cluster and contained a rationale, a specific behavioral objective, a learning activity, and a learning practice. The rationale for the task package attempted to delineate the purpose of the package and to explain to the student the importance of mastering the material therein. The behavioral objective for each package was stated in terms of observable performance so that the goals could be adequately evaluated by the student and his instructor. The learning activity included reading references and, in most cases, a sound-slide program. The learning practice was a step-by-step process practiced by the student to achieve his objective. Most of the work of the task package was planned to take place in the Learning Resource Center, but the student was required to return to the laboratory for the learning practice.

When the student has completed the learning practice, he is referred to his instructor for an evaluation of his work and assigned the next task package or returned to repeat the work in accordance with the standards as stated in the objectives. If he is assigned a new task package, he returns to the Learning Resource Center and re-starts the cycle.

When a student has completed all the task packages within a unit, he is given a unit test, which was also prepared by the RCA content specialists. These tests consisted of theory questions, multiple choice, matching, and completion items. In many unit tests, a performance portion is also administered. For this part of the test, the student must return to the laboratory, be given the necessary information and materials to perform the project; and upon completion of his work, be evaluated in accordance with the instructor's check list. The student has this check list in hand at the outset.

This instructional program at Sanford was based on two hours of instruction per day, five days per week. The four occupational clusters were characterized by such features as flexible scheduling, individualized learning, instructional units, independent study, and the facilities of a Learning Resource Center, which provided audio-visual and other instructional aids. All of these features are desirable adjuncts; however, the instructional materials were developed in such a way that a student could achieve the objective without multi-media, should a school system not be able to afford it. As a corner of the laboratory or an adjoining room could be set aside for the task package work, a learning resource center would not be an absolute necessity.

For the student, this system allows considerable flexibility. As the individualized instruction encourages each student to pursue specific learning objectives at his own rate of speed, he may generalize or specialize in an occupational cluster. The system also provides for the student who has prior knowledge of a portion of the course; as he may petition, and on the basis of suitable testing materials and procedures, enter, exit, or by-pass a portion of the course as his knowledge and performance level indicate. Thus, for many students, learning might be more rapid in this system than in the traditional approach.

The role of the instructor and the student in the individualized learning system is considerably different than it is in the traditional system. The instructor, since he will almost never have all of the students assembled in a group, will perform in the role of a coordinator rather than an imparter of knowledge. The instructor must maintain a progress system on his students. He must provide individual help to students throughout the instructional program. The instructor should experience a minimum amount of difficulty with students who will come to their laboratory for only one unit of instruction. He should also find this system beneficial in working with students who may enter late in the school year or those who leave early.

Now that the individualized package system at Sanford Central High School has been in operation since September 1972, what are the reactions to it by the teachers, administrative staff, and students? In a survey of the Sanford administration and faculty who are involved with the individualized instruction program during the 1972-1973 school year, it was found that 60 students were enrolled in carpentry; 69 in brick masonry; 118 in drafting; and 81 in metals for a total enrollment of 328.

Of these students, 85% are expected to reach job-level competency by use of the individualized package system. Ten percent of these students experienced severe reading difficulty in reading the task package, and 5-1/2% of the students had to be referred to the remedial reading program. The students attempted a package an average of 1.7 times before mastering it and moving on to the next package.

Five of the respondents felt that students were progressing faster and learning more under the individualized package system than under the traditional system, while one felt that progress and learning was about the same. They felt that 82% of the students were having their needs met by the individualized package system. By the middle of February, the most number of packages completed was 75; the least, two; and the average, 28. At the same time, 25% of the students had taken advantage of the feature of the individualized package system that allows the student to test through on prior knowledge. The most number of packages completed by testing through was 20; the average, ten.

There were 18 sound-slide machines available to the students. The respondents reported that this was an adequate number and that the machines were in use about 50% of the time. They felt that the sound-slide package added materially to the student's understanding of the package.

In a comparison of package students with those taught by the traditional approach, the respondents found that 71% of the students were happier in the package program; 24% about the same; and only 5% less happy. Discipline proved to be a problem in only 13% more cases, with about 26% of the students remaining the same, and 61% causing fewer problems. Motivation through the package system proved to be more in 67% of the students; 26% remained about the same; and only 7% showed less motivation through the package system. Students who showed more energy and industry amounted to 41%; and 14% showed less energy and industry. Sixty-six percent of the students were more cooperative; 26% were about the same; and 8% displayed less cooperation. Rating the students on dependability, the respondents found that 45% were more dependable; 47% about the same; and only 8% less dependable. Eighteen percent of the students were more punctual; 74% about the same; and 8% less punctual.

The respondents reported that, while large discipline problems decreased in number, there was an increase in small problems. They also found that a problem arose because the students wanted to omit the textbook and reading part of the cycle. By omitting this portion, they were then unable to comprehend the practical part of the cycle. One of the assets reported was that by not being required to spend as much time with all the students, instructors were released to work more with those who were having problems. The respondents were also pleased with the rapid pace of learning in the average and above average students.

The key figure in any learing situation is the student. The Sanford administration and faculty did a survey on October 26, 1972, to discover how the students were reacting to the individualized package system. That survey follows herewith.

1. I like having the responsibility for learning.
   Always (119) Sometime (135) Never (3)
2. I like this new system of learning more than listening to an instructor lecture.
   Always (146) Sometime (99) Never (11)
3. I find it helpful to have the statement of the reasons for learning (Rationale).
   Always (117) Sometime (132) Never (6)

4. I find it helpful to have the statement of what I am expected to do (Objective).
Always (154) Sometime (93) Never (8)
5. I am able to read and understand the instructional package.
Always (114) Sometime (139) Never (1)
6. I learn more from the reading references than the sound-slide program.
Always (25) Sometime (154) Never (36)
7. I like to be able to learn at my own speed.
Always (222) Sometime (36) Never (0)
8. Upon completion of a task package, I feel confident that I have achieved the Objective.
Always (126) Sometime (128) Never (5)
9. Considering all things about this new instructional system, I think it is a more effective method of learning.
Always (145) Sometime (100) Never (10)
10. What do you like most about this new approach?
Learning at own speed (144) Not listening to instructor talk (23)
Challenging (7) Not boring (10)
Like the Sound-Slide Programs (23)
Like having the responsibility for learning (13)
Easier to understand (16) Total responding 235
11. What do you dislike most about this new approach?
Dislikes reading (19) Responsibility for learning (3)
Repeats materials (10) Sound-Slide Programs (6)
Can't always understand — ask for help (18)
Instructor doesn't have enough time (2) Total responding 58

Reaction to the program is probably best summed up by a remark from one of the administration in Sanford. He said, "Everything is going well. It is not perfect, but it is much better than the old way."

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Industrial Arts in the Open Learning Environment

Thomas Keck

Open schools are usually thought to have no classrooms, or at least no walls. This doesn't mean much to an industrial arts teacher, since the average I.A. lab is pretty free of walls anyway, and even if it weren't, it wouldn't make much difference. The things that many teachers in other disciplines worry about — noise, control of kids, supervision — have always been problems we've lived with.

The changes in the classroom are not as important to the I.A. instructor as a lot of other things which go along with a general move toward the open school. In fact, there are so many other important points about this general trend that what happens in the classroom in the rest of the school probably isn't as great as the advantages that occur for the really innovative I.A. teacher.

What are a few of these things? I say a few because no one has declared that everything has been thought of, or that what we have so far has got to be used.

Let's take a look at scheduling.

COMPARISON OF TRADITIONAL AND FLEXIBLE MOD

How much of the student's time is going to be scheduled in the open school? Perhaps all . . . perhaps only 50-60%. And what does that mean for the I.A. teacher?

It may mean that the students will have time that they can decide what to do with. It may mean that labs will be generally left to the individual. And that can mean that a different approach to running your labs may be necessary.

If part of the time is left unscheduled, or unstructured, or whatever you decide to call it, what will you do in the rest of the scheduled time? This approach will be different too, since you will know, and your students will, that there is a whole block of time that is left for them to do much of their practical work in. Since they have been left the time for lab work, what will happen in your instructional time? The time may be exclusively given to instruction.

You can begin to see that there will be some differences in the open system that may be different differences than what you expected.

Before we talk too much about scheduling (since this is not the most interesting subject in the world) let's take a look at another change that is becoming a part of the open school.

TEACHER-ADVISOR SYSTEM

Students and teachers get to know each other a great deal more in open schools; at least, that seems to be the case. One way this happens is through a new way of arranging the guidance systems. Whatever way the guidance is being done in your school now, any motion toward open environments will get a lot more people into the picture.

For a start, we will ask all teachers to do a part of the advising, and not just advising students on what college to go to. We will try to give them help on an individual day-to-day basis, without the usual me-up-here-you-down-there set-up. We'll try to do what maybe we should have been doing all along - that is, really get to know the kids.

The more you get to know the kids, the better your courses should become. You may regard kids as being more responsible than if they just come trooping in the door three times a week and you go into your act.

Let's look at what is called the teacher-advisor system. Each teacher has a group of kids, just like the old home-room teacher, but with a greatly expanded role. It's the teacher-advisor's role to get in touch with parents when the student is in trouble, to get the student to make up work that is behind, and to pass his courses. And most important, the administration of the school doesn't make a move with that student without having the teacher-advisor present.

Of course, all this is a simple change, and there really isn't any guarantee that great things are going to happen, but there are a few things to consider. First of all, look at your role.

You think you are an industrial arts teacher. Suddenly you find that you are a great deal more. You are friend, advisor, and father-confessor to a group of students, and you have some responsibilities that you never thought you'd have.

An important change takes place. For one thing, you have to realize that other teachers are in the same role, and they will be watching out for their advisees. There's someone for each student whom you can go to when a student is not performing, not just one or two overworked guidance counselors, but a member of the faculty who is having the same problems that you are having with another group of advisees.

Hopefully, this system brings people together. Even if that's not the greatest effect, it tends to have teachers and students supporting each other in the general job of education. You don't find this in every school; this may be a way of starting the ball rolling.

RESOURCE CENTERS

With the walls gone, what happens to the traditional areas of the school? What happens, for instance to the library? What happens to the study halls?

Media variety becomes so important in the open school that the old library really does become a media center. The whole thing becomes a way of collecting and cataloging resources, a place where resources are made, prepared, and kept available for the individual teacher.

Because it is so important, it can't be all jammed into one room. Each discipline has its own needs for media, so each discipline needs a part of the total media center.

Let's give each subject area a center for its own resources, and let's let each of these resource centers be near the area where most of the instruction is done.

Each of these areas need someone to take care of it, to keep things neat and available for the students. When students have unscheduled time, not all of their individual study work is going to be done in the lab. Some of it involves looking up specs, reading the latest journals and house organs, and watching or re-watching the various tapes, film loops, or slide presentations which are available.

Whoever is aiding the students must be familiar with all of these media. Since the student's unscheduled time and the time allowed for teachers to help students may not coincide, the resource center must be a round-the-clock operation, ready to provide the resources at any time.

Most schools give a teacher a budget to buy the things he needs. But even though the various suppliers are working to sell you things, you may find that not enough of what is for sale meets your needs. So what can you do?

Make it yourself. And for this very reason, the media center of the open school has to be a special place. It has to have facilities not only to store and have media available; it has to be able to prepare and produce a good deal of it. Whether it is film loops, slides, transparencies, LAPS, videotapes, or whatever you need, the school has to have its own facilities.

Here again, I might mention that unscheduled time for the student means a space that can be filled with learning. But there has to be something to fill it. For instance, there has to be a way of reviewing a lesson or taking part of a course he may have missed. How about videotape or videocassettes? Expensive, yes. But you might point out to the keeper of the purse that they're cheaper than you. You should be free to do things that require a person. Let the machines do the work of repeating what you say.

Slide presentations. Make them yourself. LAPs. Write them yourself. And casettes. You make them or have the students help out.

Sound easy? No, it doesn't... and it isn't. It's hard work, and it requires teachers who really are dedicated. I guess that this method of schooling is harder on the teacher than any other. It requires really talented teachers who are convinced what they are doing is worth doing.

FLEXIBILITY

But if you get tired just thinking about all those things, let me mention a few new things that are easier on the teacher and a few things that at least make the job more rewarding. You know, the usual proponent of open school systems stands up and makes it all sound like the answer to your prayers, the combination to Fort Knox, and the cure for the common cold all wrapped up in one battery-powered package. Well, as the evaluations come in, there are some hits and some misses, but one of the greatest things is the flexibility in scheduling.

Because the space is flexible, the time is more flexible. Since the resources can be changed and rearranged, there are more combinations. Not only combinations in time and space, but combinations in faculty and students.

For instance, we ran a course that combined I.A., math, and science. We were able to get all the teachers and students together for the courses and for the labs. Sometimes we asked for large-group meetings, sometimes for small-group meetings, sometimes for no meetings. It helped us, it helped the math people, and it helped the science people. But we felt, most of all, that the kids were given corelation between the theory, the language, and the practicality of what we were talking about, and the classes certainly were more interesting.

With a flexible scheduling system, based on a 20-minute mod measure, you can ask for tailor-made meetings. You can get half-day sessions once a week or 40-minute sessions every day. You can make the schedule work for you, not the other way around. And the greatest benefit is that no one in the school can use the schedule as an excuse for not doing something.

Next year we are planning a course in combination with the English department of the school relating to the communication aspect of industrial arts: how to write about what the students are doing and helping them in their comprehension of their reading assignments. The teachers will probably learn more than the students, but that's all right, too.

I guess that one thing that is hardest to explain is the fact that when the old time-honored schedule disappears, the kids start to make the decisions that their teachers used to make for them. And when they really start to look around a school, the competition for their attention gets pretty keen.

An I.A. department that is really on the ball will be able to take great advantage of this situation and get kids into the lab who would never have been there otherwise. You have to find ways of keeping your program out before the students. It's almost a sales job, except that it sort of sells itself, if you do it right.

Take, for an example, printing and the whole graphics situation. A school newspaper can tell the story to the entire student body. How about projects performed in the student lounge, or in the cafeteria?

Here's an example. A little experiment was performed in the cafeteria. This was part of a course in power in a subsection on rocketry. This bubble was similar to the space capsule environment, an inflatable balloon, teacher-student made, and teacher-student enjoyed. The purpose of the bubble is to create a total learning environment. It is constructed from 4-mil polyethylene folded into an envelope 12 by 12 feet; a window fan is connected to a tunnel to blow up the structure.

Another example. We pulled a materials testing machine out into the main corridor of the school and did some tensile tests. A crowd gathered, and we definitely opened some minds.

WEAR GOGGLES WHEN
USING THIS MACHINE

Superimposed material testing specimen.

In another example of what power means, we had the Vermont state woodchopper champion, Bob Hoffman, race a power saw through a ten-inch log. We ran this experiment in front of the school. Not only did we get our own large-group scheduled class of 49 students, but we picked up a few more. By the way, he won.

A computer was used in material testing class for calculating tensile strength of material in p.s.i. A format was used so that after inserting the breaking strength of a certain diameter specimen, the computer would spit out the p.s.i.

An excellent example of use of 2 video cameras and mixers was to make a tape of the material testing machine, using one camera to shoot the specimen while it is elongating and the second camera to shoot the dial reading strength. Then, by using the mixer, superimpose the dial behind the specimen so the breaking pressure can be read more easily on tape.

Two architecture drafting students designed and built a dome. After the prototype, the students inflated a 24-foot diameter weather balloon and covered it with fiberglass.

One way to motivate the students to think about technology, both pro and con, is to stage a staff debate in a large-group session and let the students become involved.

CONCLUSION

There's no conclusion to this presentation because there's no conclusion to the entire subject. Open schools may never come to a conclusion. And unless they put the schools out of business, they'll still be part of what teachers and educators are talking about in the future. Talking about, thinking about, and doing things about. Some open schools will succeed and some will fail, but this is still the direction that education is taking.

Mr. Thomas Keck is Team Leader, Industrial Arts Department, U-32 High School, East Montpelier, Vt.

NTERDISCIPLINARY STUDIES

American Industrial Development: An Interdisciplinary Approach

Nick Teig **Phillip J. Nelson**

The Industrial Education and Social Studies Department of Malcolm Price Laboratory School developed and cooperated in an experimental program during the Spring semester of 1971. In response to various demands made upon education to provide relevant learning experiences for today's students, 63 10th grade U.S. history students manufactured and sold a product as a phase of their study of United States industrial development. Their learning experience represented a combined teaching effort between the two departments illustrating the methods used in modern industrial complexes plus an examination of reasons for the national transition from a farm-merchantile economy to a manufacturing economy.

The project came about from a faculty meeting designed to inform each academic department about what others were doing in their classes. We found that both the industrial education and social studies departments taught units explaining the development of an American industrial economy which in turn created a technical society.

For some students, this overlapping caused repetition, but at the same time provided them with another dimension to the topic. However, the majority of students, especially female students, became aware of only one viewpoint — the historical development — without experience with actual processes.

Contemporary economic and historical authorities[1] recognize that the change from an agricultural to a manufacturing economy, which had been initiated during the Colonial Period in the United States and accelerated during and after the American Civil War, terminated about 1920. During this transition, the number of people engaged in farming declined progressively until today only 4% of the population are classified as farm workers.[2] Industry became the major employer of people in the United States, with seventy million of the nation's work force currently employed by non-agricultural establishments.[3]

Because the farm-to-industry transition affects each student, the authors believed certain considerations necessary while developing the project. First, all secondary students enter the industrial society in some manner. Either they are employed directly by industry or they experience the benefits of manufacturing as consumers. Thus, it seemed essential that students experience problem situations which provide them with the necessary background to understand and cope with a modern technical society. Second, female students and those male students entering the traditional college preparatory program find it difficult to become involved with industrial education. Third, the instructors believed it necessary for students to realize how our society reached the present stage of industrialization. Typically, educators have attempted to promote student understanding exclusively in reading and lecture-discussion activities.

American Industrial Development: An Interdisciplinary Approach provides students with a historical perspective, an awareness of certain economic principles, and actual work experiences in the manufacturing process. It also sensitizes them to critical and persistent economic and social problems affecting people in a technical society. Initial episodes promote student comprehension of basic economic concepts; later episodes require them to carry out business activities; and finally, they investigate the forces causing the economic transition. The teaching unit encourages students and teachers to search for a wide range of information sources. Furthermore, both students and teachers sense opportunities for social and political action.

UNIT OBJECTIVES

The primary concern of the teacher and students using the unit is the development of selected inquiry skills. Successful completion of the program requires the acquisition, interpretation, and evaluation of data needed to draw valid conclusions. It provides students with opportunities to examine social and economic problems and alternative solutions to these problems. While acquisition of information is an important goal of the unit, it is used as a means to promote refinement of problem-solving skills.

At the conclusion of the episodes, students experienced the following:

A. Skills

1. Identifying, acquiring, and organizing information related to specific economic questions.
2. Drawing conclusions as to the nature and extent of economic development and alternative solutions to those problems.
3. Preparing and presenting reports to fellow students.
4. Expressing knowledge and ideas by writing analytical essays and completing objective tests.
5. Organizing the production of a consumer product.
6. Constructing jigs and fixtures necessary for producing a consumer product.
7. Developing advertising techniques to market a consumer product.
8. Identifying the methods business uses to solicit and screen job applicants.

B. Knowledge

1. The forces responsible for the United States shifting to a manufacturing economy.
2. The methods for producing and distributing the benefits of our industrial process.
3. The advantages industrialization provides consumers.
4. Social problems created by industrialization, and how these problems can be resolved.
5. Production efficiency of the assembly line process.
6. The importance of each individual to the production team.
7. The pressures of industrialization on workers and management.
8. The reasons for the birth and growth of American labor unions.
9. The differences between labor and management, and how these differences can be solved.
10. How a corporation is organized.
11. The need for compromise between groups with polarized interests.

PROGRAM DESCRIPTION

The learning activities described in the planned episodes are suggestions based upon the authors' experiences with their students. Other teachers may wish to devise other strategies meaningful to their students. The episodes are indefinite in terms of class periods. Teachers using this plan will discover that some may be developed within only one class period, while other episodes require several class periods.

Episode I

The instructors initiated the learning experience by administering an attitudinal survey gauging student sentiment regarding present-day industrialization, followed by a pre-test measuring their funds of information related to the American economy. Students next viewed the film, The Modern Corporation. A discussion of key points preceded the formation of a student corporation, in which each student bought one share of stock for $1.00. Student stockholders elected a Board of Directors, three in number, who then selected management officials (President, Vice Presidents for Sales, Production, and Personnel, along with a Comptroller, Treasurer, and Production Foreman). In addition, the class, through a "brainstorming" session, considered products which they might manufacture and sell.

Episode II

The instructors conducted a study of basic economic concepts necessary for student understanding of manufacturing development and processes. Students first compared retail catalogs[4] illustrating how man's wants increased during the past century and how industry complied with a variety of goods and services. Next, the class engaged in a simulation activity emphasizing the emergence of the corporation as the most efficient producer of goods and services. Third, they plotted supply and demand curves which interpreted factors determining the equilibrium of price, supply, and demand in a competitive market. Fourth, students participated in a role-playing activity which sensitized them to agents promoting competition, and the effects of competition in a free economy.

Episode III

With the class working in the industrial arts classrooms, students participated in an exercise designed to make them aware of mass production through actual manipulation of materials. Students formed two groups; Group A received instructions indicating how they could individually produce three pieces of wood with holes drilled in them as parts for a simple production. At the same time, Group B acquired the same materials, but they were shown how to employ techniques of quality control and division of labor. After both groups produced their parts, the wooden pieces were placed in their respective piles, and each group organized their own assembly line. Group A soon discovered that their parts, produced individually, did not fit together when students attempted to assemble a simple triangle. Group B, having used quality control techniques and division of labor, found that the parts of their production fit any assembly with a minimum of lost time, wasted materials, and physical motions. Students analyzed the results and concluded that mass production techniques, with controlled processes, resulted in a more efficient output of goods.

Episode IV

Previously, students suggested product ideas including sketches, designs, and working models. Through their corporate structure, they now arrived at a product — a wall plaque promoting school spirit. Next, the student production manager[5] described the operations necessary to produce the product and prepare it for public consumption. The class then prepared a production flow chart.[6]

Episode V

The students experienced methods used by industry to solicit and screen applicants for positions on a production team. With a product and the method of production decided, students applied for a variety of jobs outlined by the production flow chart. They competed with classmates for these positions by taking a battery of mechanical dexterity tests,[7] followed by an interview with the corporation's personnel department. The episode concluded by having management officials consider three hypothetical problems:

How would management react if

1. some applicants turned down jobs because of the low wage scale;
2. a labor organizer wished to form a union;
3. one raw material supplier could not supply the quantity needed, but his costs were lower; a second supplier could meet the quantity needed, but his costs were higher?

Episode VI

Students performed the physical activities for production, assembly, and packaging the product. During this part of the program, students identified actual examples of mass production techniques. They saw their product in various stages of completion on their own assembly line.

During this phase, the instructors also provided students with concentrated experiences in related topics. A student labor organizer promoted unionization, which ultimately led to a work stoppage. Students then studied the causes of previous strikes in our country's history, observed films about the labor union movement and contract negotiations, and heard representative guest speakers from labor and management. Students representing labor and management then negotiated their own contract, solving the corporation's labor problem. Finally, the class analyzed the impact of a strike on the local, state, and national levels.

To provide the class with another dimension, individual students gave reports based upon their reading of Arthur Haley's Wheels. They identified and compared examples of psychological and emotional stress on workers and management personnel with pressures experienced in their own corporation. For example, the student director of advertising reported the difficulties she encountered planning the promotional program. She related to classmates how difficult it was to get to sleep at night because she kept thinking about ways to advertise the product. Two other student workers on the assembly line reported to the class how quickly they became bored with their jobs on the production line.

Episode VII

The true test of the corporation's effectiveness came with marketing the project. The instructors initiated this phase of the project by having students categorize methods and techniques of modern advertising together with examples they brought to class. The advertising director then described the tentative promotional program to the "stockholders." After a general discussion, the advertising program began, with all students becoming salesmen; they liquidated the entire inventory in five days. The episode concluded with the corporation paying its expenses and dividing the profit among the stockholders.

Episode VIII

Students began an investigation of the forces causing the United States to change from a farm-mercantile economy to a manufacturing economy. The instructors divided the class into five groups, with each researching one of the following focus areas: the liberalized land policy of the U.S. government, the development of a transcontinental railroad, the growth of a sophisticated financial system, the emergence of giant entrepreneurs, and the role of government in economic activity. Each group presented a panel in which they discussed how their individual factor contributed to the transition from an agriculturally-based to an industrially-based economy. In addition, students identified how these forces promoted the reform movements commonly called the Progressive and New Deal Eras.

Episode IX

The instructors concluded the nine-week project by re-administering the attitudinal survey and permitting students to complete the unit exam a second time. The instructors believed that by administering the attitudinal survey and unit test at the beginning and the end of the unit, they could better evaluate student attitudinal changes coming from the experience and more effectively measure student growth in terms of acquiring and using factual information.

The instructors also made initial student evaluations during the manufacturing phase. They assumed the role of employers during the assembly line activity. During management planning sessions, the instructors viewed the proceedings as interested stockholders.

The authors attempted to judge each student as they would be judged by others in a real-life situation. Also, the success or failure of marketing their product provided another means of evaluating student performance. Finally, numerous daily assignments, special projects, and panel discussions concluded the evaluation criteria.

The first significant observation of the project is the fact no money is spent from either a school or department budget. Students finance their corporation by purchasing stock in their company. Instructors can set an appropriate value for each share of stock, depending upon the manufactured product.

Second, the project format allows for multi-discipline opportunities. For example, the business teachers can help set up the accounting system; English teachers can acquaint students with literary works related to the topic; sociology teachers can provide insight to social issues emerging from work activities; psychology teachers add expertise to psychological stresses; economics teachers can be used in numerous instances; political science teachers can point out political aspects of the topic; and science teachers can help with technical assistance. The prospects are unlimited.

Third, the project stresses active student involvement rather than passive study, which causes a higher degree of student interest.

Finally, interdisciplinary projects allow teachers to see beyond their own subject matter and develop an awareness how their courses fit into the educational spectrum.

FOOTNOTES

(1) Kirkland, Edward C. Dream and Thought in the Business Community (Ithica, New York: Cornell University Press, 1956). Sitterson, J. Carlyle, "Economic and Social Revolution" Interpreting and Teaching American History, 31st Yearbook, National Council for the Social Studies (Washington, D.C.: National Council for the Social Studies, 1961). Morison, Samuel Eliot, and Commager, Henry Steel, The Growth of the American Republic, Vol. II, 4th ed., revised (New York: Oxford University Press, 1950). Hofstadter, Richard, The Age of Reform: From Bryan to F.D.R. (New York: Alfred Knopf, 1961). Heilbroner, Robert L. Making of an Economic Society (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962).

(2) "Statistical Abstract of the United States," U.S. Department of Commerce, Bureau of the Census, 1971, page 223.

(3) Ibid., page 217.

(4) Sears, Roebuck Catalog of 1898 with current (1971-1972) catalogs.

(5) The student production manager assumed responsibility for the physical production of the product. He first searched out available library materials explaining his duties within the corporation. Second, he conferred with the industrial education instructor, who explained the machine-tool operations and the sequence materials had to go through to achieve an end product.

(6) Students used standard flow chart symbols used by industry while determining the production sequence.

(7) The testing battery contained the Minnesota Paper Form Board Test, Midget Peg Board, and Teig Finger Dexterity Test (the last two were teacher-made). The Minnesota Paper Form Board Test illustrated an example of a group-administered paper and pencil mechanical-aptitude test, while the second and third tests measured individual mechanical ability.

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FIVE-IN-ONE! An Interdisciplinary Program for the Disenchanted Student

Norman Metzger

The high school of our school district is typical of all high schools in respect to having a number of students who are disenchanted with school. Our disenchanted students are turned off because none of the programs we have to offer seems to offer them anything. Our theory about this is that what we have to offer has little meaning for them because they have such a vague idea about what they will do with it after they've got it. To say it another way, our disenchanted students have not determined a post-high-school goal.

The students in our high school who have their sights on college are aware of the relationship of their high school studies to their immediate post-high-school activities. And so are the students in our business curriculum, our vocational agriculture program, our home economics program, or one of the many other vocational or technical programs of our area vocational technical schools. While not all of the students in these curricula are completely sold on their high school program, they can see some rather obvious connection between it and what they may well be doing when they leave the secondary school.

Consider, however, the students who are not in one of the identified programs. For one reason or another, they are not in a college preparatory program or one of the vocational programs. Thse people, who constitute around 40% of the total school enrollment, have often been referred to as "general" students. When general students are interacting with their high school program, the connection between that program and what happens after high school is not so obvious. For some, a relationship can be perceived. For a great many, the relationship is taken on faith. For many others, the relationship cannot be perceived nor is it accepted on faith. It is the non-perceiving, non-believing, disenchanted students who most need a different program.

They need a different program because they can see no meaning in their isolated English III, American Cultures II, Biology I, or Foundations of Math II classes. The meaning is obscure in major part because they have determined no post-high-school career with which to relate their studies. Also contributing to the problem is the seeming lack of relationship between their compartmentalized traditional subject courses.

We have postulated that school disenchantment is caused by a student's inability to perceive meaning in his program. We attribute the lack of perception to the absence of a post-high-school goal and to the traditional isolation of the separate high school courses. If we have accurately defined our problem, the definition seems to provide the solution. The definition suggests that students need to search for and determine a post-high-school goal. During that search and when the goal is determined, they need to perceive relationships between their high school program and their life situation.

Five-In-One is an interdisciplinary program designed to present mathematics, communications, science, and social studies educational experiences as they relate to prevocational career experiences. It is a complete program for a high school student until the time that he can find another program that provides still greater meaning for him.

Five-In-One employs written modules of integrated instruction; team teaching; hands-on-high-interest activities; occupational guidance; field experiences and the cluster organization for presenting occupational experiences.

Five-In-One has been field tested in a summer program and promises to impact with a powerful effect on our traditional curriculum.

Mr. Norman Metzger, Curriculum Coordinator, is a member of the administrative staff at Penn Manor School District, Millersville, Pennsylvania.

Interdisciplinary Cluster Teaching

George H. Ditlow

This interdisciplinary cluster proposal was submitted to the United States Office of Education, Bureau of Educational Personnel Development, through the Millersville College Foundation as an extension to the first phase of the project currently under the direction of Dr. Edward Kabakjian, Executive Secretary, American Industrial Arts Association. The plan of operation currently in the state of completion carries the O. E. Log No. 5014. It was an outgrowth of the involvement of the American Industrial Arts Association at the CONPASS Grove Park Institute project in June 1969.

PROJECT GOALS

The purpose of this project was to train teachers to prepare and teach an integrated-interdisciplinary curriculum clustered around concepts in industrial arts power technology.

The underlying objective was to provide a total educational experience for boys and girls representing students who are basically underachievers and disenchanted with school and who represent the greatest portion of dropouts.

Another primary focus was on the behavior of teachers representing the subject disciplines of mathematics, science, social studies, language arts (communications), and industrial arts as they operate in a team-teaching environment. The instructional program attempted to homogenize these disciplines by integrating the knowledges and skills of the disciplines into common course content. This content was then taught through a team arrangement of the teachers using flexible scheduling.

Evaluation of the program was based on the observed success of learners, observations by the project coordinators, and self-evaluations by the teachers, counselors, and learners themselves. A discussion of evaluation instruments, testing, and computation of data is included in this report.

A final product of the program was the development of guidelines and instructional format for an interdisciplinary program involving subject matter content from mathematics, science, social studies, communications, and industrial arts. The program was designed for 120 hours of instruction. Eight additional interdisciplinary programs of 120 hours each are presently being developed.

A second product was a model of special in-service teacher training and pre-service training for teaching an integrated-interdisciplinary program.

SCOPE

The premise upon which this program was designed is the fact that many students drop out of school before completing their secondary education experience. Related to the reasons why children get "bored" with school is the fact that students find it difficult to apply and transfer knowledge from one learning situation to another, and the methods of facilitating success in the learning process are geared primarily to the academically talented students (college bound) and not to students who have had a history of learning difficulty.

Educators have been successful in organizing knowledge and skills into logical and internally consistent disciplines (e.g., mathematics, science, social studies, industrial arts, and communications), but students have been less successful in integrating and applying the subject matter within the conditions confronted in everyday living. The inte-

DESCRIPTION
of the disenchanted student

NEEDS CAREER GUIDANCE
HAS NO POST HIGH SCHOOL OBJECTIVE
IS NOT IN COLLEGE PREP COURSES
IS NOT IN VO-TECH PROGRAMS
CANNOT RELATE COURSE WORK
TO *ANY GOAL*

DISLIKES SCHOOL

and sometimes

DROPS OUT

gration of the disciplines will bring the content of instruction in the language arts, social, and physical sciences to life and enhance the learner's chances for success.

Learning to live in our technological culture is a concern and theme of industrial arts educators, but one which could be adopted by all educators. Use of the theme "Man and His Environment" insures a topic that is relevant to the interests of youth and to the immediate needs of society, as well as providing the participating subject matter disciplines maximum opportunity for relating content to the world of reality.

The inability of public education to make significant improvements in the success ratio of potential school dropouts and thus retain them until normal and successful graduation suggests a look at both the method of instruction and the organization of the content. The development of an interrelated-interdisciplinary curriculum taught by subject matter specialists in a learning center void of block scheduling will increase the students' ability to apply newly learned skills and knowledge to related activity.

At the heart of the integrated-interdisciplinary curriculum project is the acceptance by each student of the premise that learning can be enjoyable and relevant to his interests and needs in life. The educational process will no longer be seen as teaching but as providing conditions necessary for learning.

Anticipated Results

Implicit in this mode of teaching-learning is a new role for both parties. The teachers must make some initial selections of the learning experiences that are likely to lead the student to a desired objective expressed in measurable behavioral terms. The teachers designed the curriculum so their role was more one of a facilitator than a dispenser of learning skills and opportunities.

The learning must focus less on the traditional replicative and more on the interpretative uses of knowledge and skills which are demanded by a rapidly changing, highly technological society which is faced with complex political, moral, social, and economic issues.

The main feature of the project was the emphasis on the changing role of the teacher and of the learner. Implicit also were the needs for multimedia resources, new organizational patterns of teacher utilization, more flexible grouping and scheduling, and individualized programs to capitalize on our knowledge of the learning styles of youth.

General objectives for the project were as follows:

1. To develop an instructional program utilizing an integrated-interdisciplinary approach designed to improve and enhance the interest and motivation of disenchanted learners who become potential school dropouts.
2. To develop positive attitudinal changes in learners toward school in general, specific subjects used in the program, and the learning process as a whole.
3. To generate models for curriculum planning and development of interdisciplinary programs which incorporate team teaching and flexible scheduling techniques. These models may be used as guidelines for in-service teachers and teacher-educators interested in teaching in an interdisciplinary context.
4. To provide an in-service experience for teachers and teacher-educators to become acquainted with and participate in the development of an integrated-interdisciplinary program. The outgrowth of this experience should provide a better understanding of what others are trying to accomplish, a better interaction among the teachers in designing an operational program focused more on learners' needs than subject specialties, a stronger relationship between the in-service teachers and the college teachers involved in the project, and experience in working in a teaching team using flexible scheduling of time and facilities.
5. To provide the guidelines for the development of eight integrated-interdisciplinary programs to be implemented on a regional basis and centered on the theme "Man and His Environment."

CONTENT SELECTION AND ANALYSIS

Since the instructional program was interdisciplinary in nature, central concepts or themes were identified by the group to facilitate integration and articulation of specific content to be developed.

Integration (coring) of these concepts was done in three steps. First, a block-type coring chart was used to record major concepts proposed by each subject as they related to industrial arts. The math, science, communications, and social studies instructors selected major concepts from their subjects using a taxonomic outline of technical concepts in power technology prepared by the industrial arts teacher. This taxonomy facilitated generation of concepts in the other subjects by providing direction and focus for content selection.

One of the chief problems in this stage was the necessity for each teacher to learn to understand the scope of content taught in the other four subjects. This took considerable time and created a period of frustration which had to be overcome. (This later proved to be an asset to the teachers.)

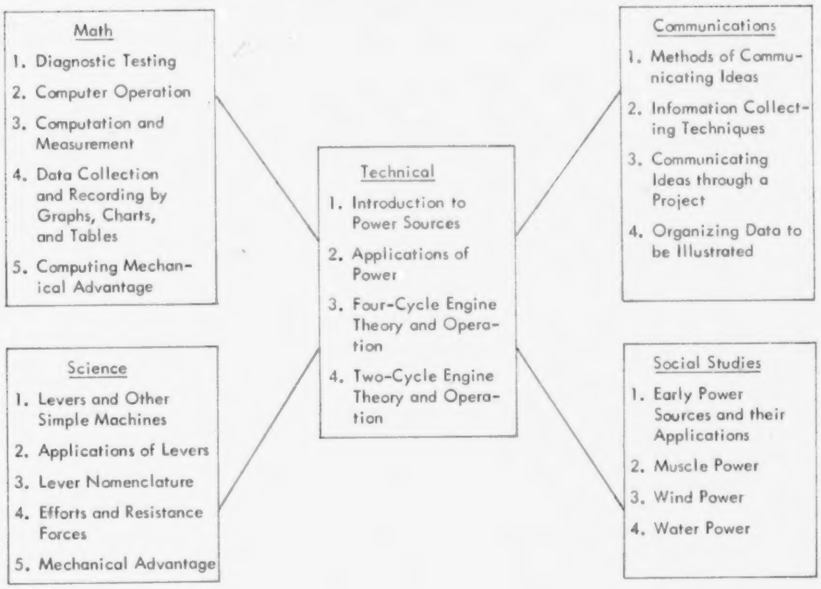
Following the coring chart, a list of central themes was developed for each subject as a second step in the integration process. A sample central themes chart is shown with the further analysis of the major topics for each subject. The central themes were daily topics and were a breakdown of the weekly topics identified on the coring chart. These themes were expanded into "big ideas" for each day for each subject and formed the basis for performance objectives development. A sample daily "big idea" chart is shown.

WRITING PERFORMANCE OBJECTIVES

Following the content selection and analysis process, the miniconcepts had to be converted to performance objectives for clarity and discrimination. The three criteria for writing behaviorally-stated objectives offered by Mager in his book, Preparing Instructional Objectives, were used. They propose the writer state the task that is to be performed or observed, the conditions under which this task is to be performed, and the extent or acceptable level of performance within these conditions.

CORING CHART

WEEK ONE: Development and Application of Power Sources



Math
1. Diagnostic Testing
2. Computer Operation
3. Computation and Measurement
4. Data Collection and Recording by Graphs, Charts, and Tables
5. Computing Mechanical Advantage

Science
1. Levers and Other Simple Machines
2. Applications of Levers
3. Lever Nomenclature
4. Efforts and Resistance Forces
5. Mechanical Advantage

Technical
1. Introduction to Power Sources
2. Applications of Power
3. Four-Cycle Engine Theory and Operation
4. Two-Cycle Engine Theory and Operation

Communications
1. Methods of Communicating Ideas
2. Information Collecting Techniques
3. Communicating Ideas through a Project
4. Organizing Data to be Illustrated

Social Studies
1. Early Power Sources and their Applications
2. Muscle Power
3. Wind Power
4. Water Power

Performance objectives were written in each of the three domains of educational objectives; i.e., cognitive, affective, and psychomotor. The affective objectives were mostly limited to attitudes, since this was one of the variables in which the project hoped to effect change.

To facilitate the identification of teaching strategies, evaluation techniques, and lesson planning, a weekly unit plan was developed which contained a list of the performance objectives for the week, selected teaching strategies and procedures planned to assist learners to achieve the particular behavior change, and a list of evaluative statements describing expected performance levels of learners in the program. A sample unit plan is provided.

SELECTION OF TEACHING STRATEGIES AND TECHNIQUES

Once the objectives were written, the teaching strategies and techniques could be determined. The group used a brainstorming process to generate different types of strategies, which in some cases produced some very creative ideas. These strategies were listed on the unit plan with the objectives as mentioned above.

Included in this step is the identification and selection or development of instructional materials. The librarian-media specialist in the program provided the teachers with the films, slides, charts, recordings, reference materials, and other aids requested.

Lesson Planning

Lessons were developed from the unit plans and focused on concepts and behaviors that were identified earlier. Each teacher developed one lesson for each of the 20 class days. A standard format was selected for all lessons, and a sample lesson plan is shown.

Variations in lesson content and sequence occurred due to learner ability differences and normal interruptions.

WEEK 1

DEVELOPMENT AND APPLICATION OF POWER SOURCES

CENTRAL THEMES CHART

	Technical	Science	Math	Communications	Social Studies
MONDAY	Introduction to small power sources. Show examples.	Observing levers and other machines to be observed on field trip.	Diagnostic testing and introduction to computer.	Selecting project to illustrate field trip experience.	Field trip plans—what to look for
TUESDAY	FIELD TRIP around Lancaster area to observe various types of power applications.				
WEDNESDAY	Introduction of four-cycle (run). Demonstrate operation. Student participation.	Lever—draw and discuss parts. Make levers.	Computation and measurement. Read ruler. Conversion tables.	Communicating ideas through a project.	Muscle power.
THURSDAY	Review of four-cycle. Student teardown.	Determine efforts and resistance of levers.	Collect data. Record data. Graphing.	Project workshop.	Wind power.
FRIDAY	Introduction of two-cycle (run). Demonstrate and illustrate operation. Student participation.	Mechanical advantage.	Computation of mechanical advantage.	Project workshop.	Water power.

Student Tracking System

An instructional program based on behavior modification requires some sort of record-keeping system to monitor student progress and behavior change. A tracking system similar to the type used in Project ABLE (Quincy, Mass.) was selected and developed specifically for this program.

Each teacher maintained a tracking chart showing individual student progress in achieving behavior changes indicated in the performance objectives. The task descriptions in the performance objectives were extracted and listed on the chart. Conditions and performance levels of the behaviors were kept in the teachers' files for reference when needed. The obvious reason for this was limited space on the chart.

IDENTIFICATION OF FACILITIES FOR IMPLEMENTATION

The school selected for the implementation stage of the project was Marticville Middle School in Pequea, Pennsylvania. The building is relatively new and modern and has a clustered arrangement of rooms, which worked out well for the interdisciplinary

WEEK 1

DEVELOPMENT AND APPLICATION OF POWER SOURCES

	BIG IDEA
TECHNICAL	Introduction to small power sources (demonstration, discussion).
SCIENCE	Levers and simple machines that are used in today's society, with emphasis on how some of these machines function, especially those which will be observed on the field trip. (Short film on the use of levers and simple machines, with emphasis on levers used by man in the past to increase his productiveness. Class discussion on the levers and simple machines identified in the film. Also, those used around the house. Lecture and class discussion of slides of levers and simple machines that will be seen on the field trip.)
MATH	Diagnostic testing and introduction to computer. (Through use of the computer we will test each student, concentrating on fractions, decimals, and whole number computation. Problems may be related to field trip.)
COMMUNICATIONS	Group will select a project from a variety of suggested areas to record and share their field trip experience. (Lecture, demonstration, discussion)
SOCIAL STUDIES	Study of early power sources and their application by means of a field trip. (Lecture, discussion, and map study relative to field trip—what to look for and route to be followed.)

UNIT PLAN

Man and His Environment
Course Title

One Week
Time

1
Unit – Week

SCIENCE
Subject

Mr. Rohrer
Instructor

BIG IDEA: Lever construction, analysis, and use is important, since man depends on mechanisms to advance his culture.

Behavioral Objectives	Teaching Strategies	Evaluation
1. Given a variety of examples of applications of small gasoline engines and motors, the student will recognize common uses of small gasoline engines and small electric motors found in our present society. 2. During a class discussion on applications of small engines and motors, the student will differentiate between types of small internal combustion engines and small electric motors and show common applications.	Show and explain different types of applications of small engines and motors in common recreational and workshop devices. Class discussion on applications of small engines and motors.	List five or more applications of small gasoline engines. List five or more applications of electric motors. Orally describe the basic differences in four-stroke cycle and two-stroke cycle engine design and operation.
3. During a field trip around Lancaster County, the student will point out and describe some of the early gasoline and steam engines used in this area.	Field trip around the Lancaster County area to observe various forms of power in use.	Orally explain the transition of power forms from muscle, wind, and water, to steam, gasoline, and electric.

LESSON PLAN

SUBJECT: Technical
WEEK: 1

LESSON NUMBER 5
TIME: 50 minutes

INTRODUCTION TO SMALL TWO-CYCLE GASOLINE ENGINES

I. BIG IDEA

Small two-stroke cycle single cylinder internal combustion gasoline engines change heat energy into motion through a two-stroke cycle theory of operation.

II. PERFORMANCE OBJECTIVES

1. The student will be able to describe verbally the theory of operation of a two-stroke cycle single cylinder internal combustion gasoline engine.
2. Given a guide sheet and appropriate tools, the student will be able to disassemble and identify basic components of a two-stroke cycle single cylinder internal combustion gasoline engine.

III. PRESENTATION

1. The instructor will demonstrate, identify, and explain:
   a. The two-stroke cycle theory of operation
   b. The basic engine components
   c. Dissassembly procedure
2. The student groups will:
   a. Disassemble a two-stroke cycle engine
   b. Identify the basic engine components

IV. INSTRUCTIONAL TOPICS

1.0 Basic parts of a two-cycle engine.
   1.1 Intake and exhaust ports
   1.2 Piston
   1.3 Reed valves

CONCEPTS AND INFORMATION

1. The two-cycle engine is constructed differently than the four-cycle engine.
2. Intake and exhaust ports are holes drilled in the cylinder wall to allow exhaust gases to escape and new fuel mixtures to enter.
3. The top of some two-cycle engine pistons are designed to aid in the movement of intake mixture and exhaust exit.
4. The reed valves are spring steel reeds which open to allow the fuel mixture to enter the crankcase.

V. INSTRUCTIONAL MATERIALS

A. Primary references:
   1. Glenn, Harold, Exploring Power Mechanics, Peoria, Ill.: Charles A. Bennett Company, Inc., 1962.
   2. Long, Kenneth, Small Engine Service Manual, Kansas City, Mo.: Technical Publications, Inc.
   3. Pipe, Ted, Small Gasoline Engines, New York: Howard W. Sams and Company, 1967.
   4. Stephenson, George, Power Mechanics, Albany, New York: Delmar Publishers, 1964.

B. Teaching aid:
   1. Two-cycle engine for running demonstration.

C. Audio-visual materials:
   1. Transparencies, charts, and diagrams showing two-cycle gasoline operation.

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cluster program. The subject areas were located adjacent to each other, with the exception of communications and social studies, which met in the library on the second floor.

The facilities were more than adequate in space and work stations. There was sufficient equipment available, which enhanced the learner's motivation to study or participate.

A discussion of the administrative and operational aspects of implementation and student post-assessment procedures follows. Faculty and staff evaluation, conclusions, and recommendations resulting from the project are also included.

IMPLEMENTATION AND TESTING

The purpose of this phase was to evaluate the effectiveness and feasibility of an interdisciplinary approach to learning for disenchanted pupils. The several variables identified in the planning phase of this project needed to be tested, which necessitated implementation of the ideas developed in the project.

For better clarity, this phase of the report is described in two parts; i.e., implementation and evaluation.

Implementation

The implementation period was set at four weeks (20 school days, six hours per day, totalling 120 hours) beginning June 19 and ending July 15, 1972. This decision was based on the modular concepts of cluster programs explained earlier. The time also coincides with a typical school day and offered a comparable amount of instruction for the four-week period.

The Sample

A maximum of 60 pupils consisting of both boys and girls was selected to participate in the implementation phase of the project. These pupils were selected from a list of incoming ninth graders in the Marticville and Millersville middle schools who expressed an interest in participation. Selection was made in advance of the program by the counselors in these schools on the basis of identified or predicted disenchanted learners and/or potential dropouts.

Fifty-two pupils actually participated in the sample, due to families moving from the area, pupils obtaining a full-time summer job, or spontaneous family vacations before the implementation phase began. Of the 52, there were 9 girls and 43 boys.

Daily Schedule

The daily schedule was as follows:

7:45 - 8:45 am - Breakfast & Group Meeting
8:55 - 9:45 am - Session One
9:55 - 10:45 am - Session Two
10:55 - 11:45 am - Session Three
11:45 - 12:15 pm - Flex Period
12:30 pm - Students Return Home

12:30 - 1:30 pm - Faculty Lunch
1:30 - 3:00 pm - Faculty Seminar
3:00 pm - End of Structured Day

A ten-minute passing period was scheduled just before and between each of the sessions.

Team Teaching

One of the unique features of this program was the opportunity for teachers to work together as a team and experience the advantages and disadvantages of team teaching. It was decided in the early phases of this project that the integrated cluster approach to teaching must be complemented with a team-teaching arrangement. This was accomplished partly during the curriculum development stages and partly during the implementation period. The coring of the curriculum around central themes facilitated teaming of instruction. The teachers met each afternoon to determine the amount of time and integration that was necessary for the following day and arranged their schedules accordingly. Pupils were divided into three groups: A (for accelerators), B (for batteries), and C (for carburetors) for ease of identification and scheduling. The only structure among the groups was the assignment of pupils from both schools to assure a mix and distribution of both boys and girls in each group. Participants were otherwise randomly assigned.

A sample of the pupils' daily schedule is shown to illustrate how the teaming of instruction was accomplished.

Sample Schedule (Wednesday, June 21)

7:45 to 8:45 am - Breakfast and Large Group Meeting
8:55 to 11:45 am - Class Sessions

Subject	Minutes	Session 1 8:55-9:45	Session 2 9:55-10:45	Session 3 10:55-11:45
Technical	20	A	B	C
Science	30	C	A	B
Math	20	C	A	B
Communi.	50	B	C	A
Soc. St.	30	A	B	C

11:45 to 12:15 pm - Flex Period

Large-group instruction was held each morning immediately following breakfast. All students and faculty were involved. Usually a film, demonstration, or discussion was used during this time to present information pertinent to the total group. This often served as a keynote session for the day.

Students were assigned to subjects during each of the three following sessions in groups of approximately 18. Within each subject, students were further divided into working groups of three, which gave the teacher flexibility in planning lectures, discussions, demonstrations, and activities. This also allowed individual instruction and activity as needed. The instruction then was planned and offered at four levels, i.e., total group of about 52, class groups of about 18, small groups of 3, and individual. Teachers utilized this flexibility of grouping advantageously during the implementation.

The flex period provided pupils with an opportunity to continue work, explore further any one of the subjects they chose, or use the time for recreation. Teachers were available in each of the classrooms, the gym, and outside recreation areas during this period. About 50% of the students stayed in the subject areas for extra work of their own choosing during the flex period.

Transportation and Breakfast

Bus transportation was provided for students during the project by agreement with the cooperating school district. Student bus lists, routes, and pick-up stations were identified as soon as the participants were selected.

Students were also offered breakfast rather than lunch each day, a unique feature of this project. The school cafeteria and regular staff were used for the meal.

Operational Aspects

Several items occurring during the implementation phase are worthy of description because of their contribution to the over-all smoothness of operation of the program.

Team Leader — The teaching faculty decided to elect a team leader to administer teaching details relating to the group and to have someone who would serve as a central communications link for the teachers. This worked out very well and facilitated the efforts of the faculty to work as a team. Dissemination and collection of data, communications, progress reports, responsibilities, etc., were greatly enhanced.

Counselors — Two middle school counselors, one from each of the schools represented, worked with the faculty to assist in solving any student problems as they arose. Since this was rarely needed, the counselors served more in an advisory and monitoring capacity. They met at least once a week with the faculty and more often as needed to help the teachers gain a better insight into the personalities of students in the program.

Since the counselors originally selected the students who were to participate, they had a better over-all knowledge of the group in the program. The counselors also worked closely with the faculty during the week prior to implementation to assist in identifying specifically the affective behaviors (basically attitudes) they felt it was important for these pupils to change. Monitoring of the instructional periods and other parts of the school day by the counselors provided an immediate feed-back system for faculty, which facilitated making necessary adjustments in the program.

Media Specialist — Another very important service provided for the faculty was a media specialist. This person was responsible for obtaining by loan, rental, or development the instructional aids needed by faculty during the four weeks of instruction. Most of these aids were acquired previous to the implementation phase from faculty lesson plans. This service seemed to be a tremendous asset to the faculty and students, as indicated in their comments.

Administration — The administrative elements were handled by two individuals during the implementation phase. The learning center coordinator served a supervisory role and worked closely with the faculty and students each day. Instructional and administrative records as well as constant program monitoring and evaluation were provided by this person.

The school coordinator worked as a liaison between the cooperating schools and the instructional team and was responsible for arranging bus transportation, breakfast, insurance coverage, procuring supplies, and other important administrative details related to the program operation.

Project Evaluation

The primary aim of this project was to change attitudes in students who had become disenchanted with school. The total curriculum package, the teaming of teachers, flexible scheduling, and type of facilities were all selected to facilitate attitudinal change in the students.

The evaluation component of the project focused on specific groups of attitudes related to (1) the subjects studied, (2) mode of instruction, (3) learning climate, (4) interpersonal relationships, (5) peer relationships, and (6) school in general. Pre- and post-tests were administered which asked for student response on a series of statements which, when scored, would indicate attitudes toward each of the six areas listed above. A discussion of these tests follows.

Test Instruments

Two tests were used in the evaluation of student attitudes. One was the School Sentiment Index developed by the Instructional Objectives Exchange, Los Angeles, California,[1] and the other, a Semantic-Differential Scale developed specifically for the project.[2]

School Sentiment Index — This is a Likert-type scale consisting of 83 statements pertaining to various aspects of school to which students respond by indicating either strong agreement, agreement, disagreement, or strong disagreement to each. Since there is no right or wrong answer, students tend to be more honest in their responses.

The 83 statements are derived from specific areas of attitudes which are: mode of instruction, authority and control, interpersonal relationships, school social structure and climate, learning climate, peer relationships, and general.

A modification of this Index, which was used in the project, solicited responses to four of the attitudinal areas on the original scale. These four (mode of instruction, interpersonal relationships, learning climate, and peer relationships) were selected as more accurately meeting the expressed aims of the project in terms of the type of attitudes to be changed. As a result of this modification, only 42 of the 83 statements were necessary.

Scoring of the responses was done by assigning numbers 4, 3, 2, and 1 to the response categories to facilitate statistical analysis. Students were unaware of the numbering system.

Semantic-Differential Scale — This scale was developed for the program to measure specific attitudes toward the subjects taught (math, social studies, science, English, and industrial arts) and toward school in general.

The semantic-differential technique consists of identifying a concept such as "school" at the top of a list of bipolar adjective pairs such as good-bad. Previous factor analyses of adjective pairs by statisticians have shown that an evaluative dimension of the person's attitude toward the concept being assessed can be determined.

A five-point scale is placed between the adjective pairs employed, and scoring is accomplished by assigning the most positive end of each adjective pair a weight of five (5) and the least positive end, a weight of one (1), with corresponding weights of four (4), three (3), and two (2) between the pair ends. After student responses are made, the scoring is done and analyzed statistically.

For this project, the following adjective pairs were used for the attitudinal factor: good-bad; happy-sad; positive-negative; pleasant-unpleasant; and nice-awful.

Analysis of Attitude Scores

In order to examine whether students' attitudes would show a change over the four-week program, a pre- and post-test design with subjects serving as their own control was employed for each of the ten attitudinal areas tested. The correlated "t" test was used to determine any differences between pre- and post-scores for each of the two test instruments used in the project. Tables I, II, III, and IV summarize the results of the analysis.

As the four tables reveal, significant differences were obtained in both Millersville and Marticville Schools on the concepts of "mathematics" and "school." In each case, the attitude toward mathematics and school increased significantly from pre- to post-test. Significantly higher post-score attitudes were obtained for the Marticville School group in "English," "school," and "interpersonal relationships." Similar significant differences showing higher post-scores were obtained by the Millersville students in "science." The only significant difference favoring the pre-score attitude was found for Marticville School students on the concept "mode of instruction." A discussion of these results is included in the Conclusions and Recommendations section of this report.

TABLE I

Pre-Post Test Scores of School-Related Attitudes as Determined by the School Sentiment Index for Marticville Middle School Students

Attitude Toward	Pretest		Posttest		Correlation	t Value Obtained	Level of Significance One Tail Test N = 26
	Mean	Sd.	Mean	Sd.			
Mode of Instruction	43.68	3.42	41.80	3.45	.15	-2.09	p < .025
Interpersonal Relationships	29.52	1.83	31.44	3.15	.08	2.74	p < .01
Learning Climate	18.44	1.50	19.12	2.47	.28	1.36	Not Significant
Peer Relationships	15.88	1.39	15.96	1.10	.51	.31	Not Significant

TABLE II

Pre-Post Test Scores of School-Related Attitudes as Determined by the School Sentiment Index for Millersville Middle School Students

Attitude Toward	Pretest		Posttest		Correlation	t Value Obtained	Level of Significance One Tail Test N = 26
	Mean	Sd.	Mean	Sd.			
Mode of Instruction	42.59	4.53	42.95	4.47	.39	.36	Not Significant
Interpersonal Relationships	30.36	2.84	30.13	2.34	.55	-.46	Not Significant
Learning Climate	18.82	2.30	18.86	2.51	.57	.09	Not Significant
Peer Relationships	16.95	1.79	16.50	1.37	.30	-1.02	Not Significant

TABLE III

Pre-Post Test Scores of School-Related Attitudes as Determined by the Semantic-Differential Test for Marticville Middle School Students

Attitude Toward	Pretest		Posttest		Correlation	t Value Obtained	Level of Significance One Tail Test N = 26
	Mean	Sd.	Mean	Sd.			
Social Studies	18.52	3.88	19.72	4.75	.17	1.07	Not Significant
Science	21.56	2.79	21.00	4.75	.29	- .60	Not Significant
Math	14.48	5.80	20.68	4.78	.37	5.13	p < .0005
English	16.32	4.50	19.24	4.43	.03	2.35	p < .025
Industrial Arts	21.24	4.64	22.04	3.58	.58	1.03	Not Significant
School	16.36	4.84	20.64	5.08	.13	3.27	p < .005

Analysis of Behavior Change

Although affective behavior change was the basic purpose of this project, the cognitive and psychomotor changes were also monitored by a tracking system similar to the one used in Project ABLE (Quincy, Mass.). The specific cognitive and psychomotor behaviors planned for each week were written on a tracking chart and checked off as the student completed or demonstrated each specific behavior.

Each teacher maintained a record of student progress on these charts each week. An effort was made to pre-assess students early in the week to determine cognitive or psychomotor behaviors already attained previous to the instruction. A different type

TABLE IV

Pre-Post Test Scores of School-Related Attitudes as Determined by the Semantic-Differential Test for Millersville Middle School Students

Attitude Toward	Pretest		Posttest		Correlation	t Value Obtained	Level of Significance One Tail Test N = 26
	Mean	Sd.	Mean	Sd.			
Social Studies	16.54	3.56	16.59	3.81	.41	.06	Not Significant
Science	17.23	4.07	19.55	2.94	.33	2.80	p < .01
Math	16.45	4.18	18.50	3.66	.60	2.89	p < .005
English	18.82	4.68	19.73	3.45	.41	.99	Not Significant
Industrial Arts	19.45	4.27	19.32	4.06	.57	-.17	Not Significant
School	17.63	2.77	18.55	3.22	.55	1.61	p < .10

symbol was recorded on the chart indicating this. With a system of this nature, it was possible to get a general picture of the behavior modification resulting from the program.

Individual Case Studies

Another form of evaluation attempted to provide a more concentrated observation of student behavior. This was the individual case study technique.

The intent was to obtain summaries of data on the background, characteristics, academic records, and anecdotal comments by counselors and teachers on three students selected at random from the group. From this, one person would be responsible for observing the students selected and record comments and observations daily during the program. Although the idea was workable, it was abandoned for several reasons, among which were oversight in the early planning of the program which did not provide for properly trained personnel to do this in-depth observation and the sheer lack of time on the part of the teachers and staff directly involved in the instructional program to do this sort of thing. The idea is sound, however, and appears in the Recommendations in this report.

CONCLUSIONS AND RECOMMENDATIONS

Following is a summary of the written and verbal evaluations of the over-all project by the counselors, teaching team, college consultants, students, and coordinators. The conclusions listed below are based on results of test data, individual and group observations by the project staff, and interpretation of remarks by students, their parents, and other visitors to the project.

Conclusions

1. The statistical analyses of test results shown in Tables I, II, III, and IV indicate significant gains across the board in attitudes toward "mathematics" and "school" in general. The Millersville students showed significant gain in attitudes toward "science" as well. In addition to this, statistically significant results were obtained in attitudes toward "English" and "interpersonal relationships" by the Marticville students. (The reason for a division of participants by schools was an internal decision recommended by the counselors to make the data more useful to them.)

   One group scored significantly higher in the opposite direction on "mode of instruction" (see Table I), which did not seem to be a problem in the other group. All other results were nonsignificant.

   An error occurred in the testing procedure which may have been responsible for some of the nonsignificant results. During the post-test administration, one group was directed to respond to the items exactly as they did on the pre-test; i.e., answer each item in terms of their feelings toward the teachers and school situation they were in last spring before participating in this project. This undoubtedly confused some students, since they should have been responding in terms of their reactions to the summer experiences on the post-test. The strength of this explanation is uncertain and is offered to the reader as a possible solution to the inconsistency between the overwhelming positive reactions expressed by the staff and students and the analysis of test results.

2. Another partial weakness in the project was the selection of student participants. The project was aimed at disenchanted youth who were identified in the cooperating school district and encouraged to enroll in the program; however, a disenchanted learner is not highly motivated to get "more of the same stuff" during his summer vacation, so additional volunteers that were judged by the counselors to be approaching disenchantment with school were selected. This provided a small portion of participating students who were interested in school and in summer programs that offered them an opportunity to extend their school activities.

3. One of the most striking benefits derived from this project was the change in the teachers. They shifted from subject-centered to student-centered in their strategies, techniques, and procedures. The teachers gained more respect and confidence in each other as they began to work more closely as a team, and it was not uncommon to see two or three teachers involved in any one lesson in a given room. Sometimes students could not identify a teacher with a subject.

   Teachers felt welcome to mingle freely in each other's classes without creating the tension or anxiety normally found when a colleague or supervisor visits a classroom. These experiences tended to weld the group together into a successful team, which had a tremendous impact on both the teachers and students. The teachers felt confident that the interdisciplinary approach is a sound and partial solution to the problem of motivating disenchanted youth.

4. An interdisciplinary teaching arrangement requires much more planning and preparation time by teachers if it is to be effective. Teachers estimated about one and one-half times as much time needed to be spent on interdisciplinary programs, as compared to conventional programs.

5. The educational media specialist used in this program provided an invaluable service to the teachers. This was the first time the teachers have had the time and assistance to develop media for their lessons. This was one of the highlights of the program, insofar as the teaching team was concerned.

6. The teacher-student ratio of approximately 1 to 11 (in this program) provided the opportunity for teachers to interact more often with students and offer individual help, which made the program more effective. A ratio of from 1 to 10 up to 1 to 20 students is recommended as a ideal maximum ratio for an effective program.

7. The breakfast seemed to work out as a distinct advantage in the project. Students were transported in for breakfast rather than lunch; the innovation was received well by students and teachers. This gave the whole group an opportunity to start the day by sharing conversation and experiences with peers and teachers and provided a large-group session where announcements could be made, schedule changes effected, and "stage setting" for the day could be accomplished with a film, short presentation, audio tape, or student activity which carried through the classroom sessions. Student comments indicated they liked this arrangement better than being served lunch.

8. The attempt to assess attitudinal change during the project needs strengthening. Additional instruments need to be examined or developed which elicit a wider range of affective data to better evaluate student behavior change. The two instruments used in this project were adequate for their purpose, but there are other facets of human growth and development that need to be tested and examined as well.

9. One of the strategies used in the project had a lasting impact on the students. One full day of instruction in Week 1 and Week 4 was conducted during a field trip around the Lancaster area to observe various forms of power in operation. The day was planned so that each teacher was responsible for some portion of the trip, and a guest narrator provided an explanation of the range of power forms observed by students. This "classroom in a bus" strategy proved stimulating to the students. A film and audio record of the trips were made by students during the day.

10. A period of frustration was experienced by the teachers during the training portion of the project previous to the curriculum development phase. The frustration seemed to come from mixing the teacher-educator training component with the teaching-team training period. Both groups were attending the early sessions. The teaching team was anxious to begin curriculum development rather than sitting in on the teacher-educators' program, which dealt with more theoretical models and systems used in

program development. It is recommended that these two functions be separated to avoid this problem.

There was also a period of frustration as the teachers began to break down communication barriers between subjects and seek information about each other's subject matter to facilitate content selection and development as a team.

Observations

Additional observations not specifically mentioned in the conclusions of the report may assist the reader to better interpret the results of the project. The more important ones are listed below.

1. Student attendance during the four-week program remained quite stable, which indicates a high motivational level. A daily average of 48 of the 52 participating students was recorded, indicating approximately 8% absentees, most of which were excused for valid reasons.

   Some of the participants began to bring in friends to visit the program. This became more frequent as the four weeks progressed, and policies had to be made to limit visitors. This indicated positive attitudes toward the program, also.

2. The program was "action-oriented," which offered greater incentive to students than the conventional "lecture" type classroom situation. Students responded to this easily and participated freely. Although this is not unique to interdisciplinary programs, there is an element of wider selection of activities when subjects are integrated.

3. The question of how much subject matter was actually learned is a valid one, since there were no assessment instruments to gather this data. It was not part of the project design because of the high concern for attitudinal change. An investigation of subject matter learned should be added to this design.

4. The physical facilities used in the program were modern, air conditioned, and essentially vacant except for this pilot program. Access to classroom and recreational facilities was no problem. In addition, the classrooms used were clustered together, which facilitated the team teaching efforts of the teachers. It may be concluded that the facilities represented ideal conditions.

   These variables may have affected the motivation of students, but it was not controlled. This raised other questions such as, "Would an open space classroom work? Could nongraded groups benefit equally with separate grade groups?"

5. The place for an integrated-interdisciplinary curriculum needs to be more accurately defined. For example, should a program like this be placed at the middle school level or high school level? Is its purpose to "salvage" dropouts or "prevent" dropouts, or both? If both, then it fits at both school levels.

6. The integrated-interdisciplinary concept designed and tested in this project is proposed only for disenchanted youth who will most likely become potential dropouts. This refers to approximately 20 to 25% of the school population. The program should find a place beside or within a conventional school curriculum to deal with this problem and offer this additional service to students.

Recommendations

The following recommendations are presented as a result of the experience and insight gained during the project.

1. The evaluation portion of the project should be improved by broadening the assessment to collect data on subject matter achievement, facility design and utilization, home visitation, individual case studies, and follow-up studies of students involved in the program to determine the rate of "prevention" or "salvage" of dropouts due to the program.

2. The teacher-training component can become more efficient now that models and procedures have been generated for developing interdisciplinary programs. Although a period of frustration due to communicating beyond subject barriers is inevitable for the teachers, this problem can be greatly facilitated with a more carefully planned training component. For example, wherever possible, teachers who are experienced in some form of integrated-interdisciplinary teaching should be used during the training portion. Their experience in this type of effort is invaluable.

3. A major recommendation of this report is that an integrated-interdisciplinary program similar to the one described here be tried in an urban setting to explore its impact on the dropout problem in urban schools. If the results of such an experiment were found to be as positive as those reported in this project, a very significant contribution can be made to the urban student and his community.

4. It is also recommended that an improved version of this project design (taking into consideration the conclusions and recommendations offered) be tried in selected regional centers in the nation. If educators and community leaders are seriously interested in finding solutions to the embarrassing dropout rate facing the nation's schools, programs of this nature that seem to hold promise for combating the dropout problem should be pursued and supported for further development.

BIBLIOGRAPHY

(1) Instructional Objectives Exchange, School Sentiment Index, Secondary Level, in the booklet Attitudes Toward School, K-12, pp. 48-51. The Exchange, Los Angeles, California, 1968.

(2) The Semantic-Differential Scale was developed specifically for the Project by Ralph Anttonen, Research Specialist, Millersville State College. It measures attitudes toward the five subject areas and a general section on the program as a whole, 1972.

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MANUFACTURING

Tooling Up for Production in the Middle School

Charles E. Campbell

The middle school is a concept which has been designed to provide students with a broad activity-based curriculum which, if effectively conceived by administration and instituted by staff, will be active and involved. It will not be a high school curriculum moved and watered down. A middle school is charged with educating the total student, not necessarily preparing him for the high school. Thinking, organizing, and behaving rationally are traits far more useful than memorizing and answering questions relating to specific facts.

The middle school student is one who varies in his cognitive and dexterity skills. He may be capable of sophisticated reasoning or he may still be very dependent on a structured curriculum. It is understood that during this difficult time of early adolescence the student is trying desperately to exert his independence in his peer group, yet depends heavily on reinforcement from the establishment. Physically, the student is in process. He is developing from gross motor skills and activities to the handling of small irregular-shaped objects. He is progressing from lower-level activities to the more sophisticated intellectual activities.

The potential of the student is virtually unlimited. Students have many interests and needs which are seldom met in a traditional junior high. If the curriculum is well planned, it will open up an entire new era of experiences and involvement. It will offer each student opportunities for career-oriented experiences. Properly planned, the curriculum can organize a conglomeration of unrelated processes. Students will be able to interrelate the sciences, humanities, and the technologies. This is in direct contrast to most junior high schools, where the subjects are taken, more often than not, because it is preparation for high school. These are usually watered down irrelevant high school courses, designed not necessarily for educating but for preparing students for high schools which in turn prepare for college and finally, if the student is lucky, he will be prepared for life. It is not a matter of just offering more options but of carefully planning relevant integration of the entire curriculum.

The middle school concept offers many opportunities for work in the technologies. The technologies can be broken down into three basic concepts: transportation, communication, and production. It is the product manufacturing area of production that I will discuss at this time.

There are many facets of industry that can be studied separately as processes or process. To individually and intensely study these as processes would be doing little more than what has been done in the past, to study many unrelated processes with no common denominator. Using industry as the model and production as the learning process or vehicle to gain insight into the total cosmology of the term "industry," we can soon find a different approach to our discipline, "Technology."

Production offers many opportunities for individualized instruction in many areas. It encourages the development of total understanding of how industry mass produces for mass consumption, starting with the pre-process of design and proceeding through to working drawings and prototype models. During these early involvements, students are able to express their thoughts in the form of drawings, sketches, or renderings of potential product ideas. A student is encouraged to "sell" his idea to the rest of the students involved in the experience. Latent aggressive behavior is often exhibited during this initial class interaction as ideas are criticized and/or complimented during their presentation.

As the selection of potential products is narrowed down, there are many minute details which are improved upon until the product is selected.

As soon as a product is selected, a company activity area overview is presented in four topical areas, with a fifth represented. These are Research and Development, Production, Marketing, and Finance and Control, with External Relations being involved indirectly. Basically, many of the Research subfunctions have already been performed during the pre-process of designing the product. Development will take place with the construction of a prototype of the product. It can be improved upon functionally as well as for cost reduction and standardization of parts (Figure I).

From here the product becomes the vehicle that takes the student through processes to an understanding of the concept industry and how it functions. Production planning activities offer many involvement directed experiences for a student to more readily

RESEARCH & DEVELOPMENT

RESEARCH
DEVELOPMENT
PRODUCT ENGINEERING

PRODUCTION

PLANT ENGINEERING
INDUSTRIAL ENGINEERING
PRODUCTION PLANNING & CONTROL
MANUFACTURING
QUALITY CONTROL

MARKETING

MARKETING RESEARCH
ADVERTISING
SALES PROMOTION
SALES OPERATIONS
PHYSICAL DISTRIBUTION

FINANCE & CONTROL

FINANCE
CONTROL
PURCHASING

Figure 1

grasp Plant Engineering, Industrial Engineering, Production Engineering, Production Planning, and Quality Control. Purchasing is also a subfunction of the activity area of production; however, it is advisable at the middle school level to delegate these activities to the Finance and Control activity area.

Marketing offers planning activities which involve the student in not only the cognitive and affective domains, but the psychomotor as well. He is directly concerned with Marketing Research, Advertising, Sales Promotion, Sales Planning, Sales Operations, and Physical Distribution.

The fourth activity area that students are involved with is Finance and Control. Students are concerned with both the finance and the control operations of the company. This division is also responsible for purchasing at the middle school level, even though it is in fact a function of Production.

The fifth activity area that is involved at the middle school level is External Relations. As functional areas, External Relations, Communications, and Information and Public Activities Coordination offer many opportunities for student involvement.

Due to the breadth of the concept of industry, it is not only impossible to relate all sub-functional areas to middle school students, but also impractical. One is able to direct students individually toward areas which will involve him in many human and material processes ranging from design, building of jigs and fixtures, mass communications, and elementary bookkeeping to experiences in transactional analysis.

Tooling up is a phase of production which involves much preplanning. It begins with the idea which leads to drawings, renderings, prototype models, revised models, and working drawings. Precision and perfection in pre-planning cannot be over-emphasized, whether it be material specifications, production planning, process and/or tool selection and design, or process and/or tool construction. Before determining which process is relevant, a number of questions should be considered (Figure 2).

1. What type of materials are involved in the product?
2. What type of work-holding device do you need? A jig or a fixture?
3. Is there machine or part motion involved in your jig or fixture?
4. Do you need a jig or a fixture?
5. What process does your problem really involve?
   A. Drilling
   B. Contour Changes
   C. Sawing
   D. Routing
   E. Mechanical Fastening
   F. Assembly
   G. Material Removal
   H. Adhesion

6. What special design problems must be considered?
   A. Exact Locations
   B. Special Processes
   C. Multiple Openings
   D. Special Finishes
   E. Protection of Finishes
   F. Special Tooling
   G. Irregular Surfaces
   H. Clamping
   I. Length of the production run

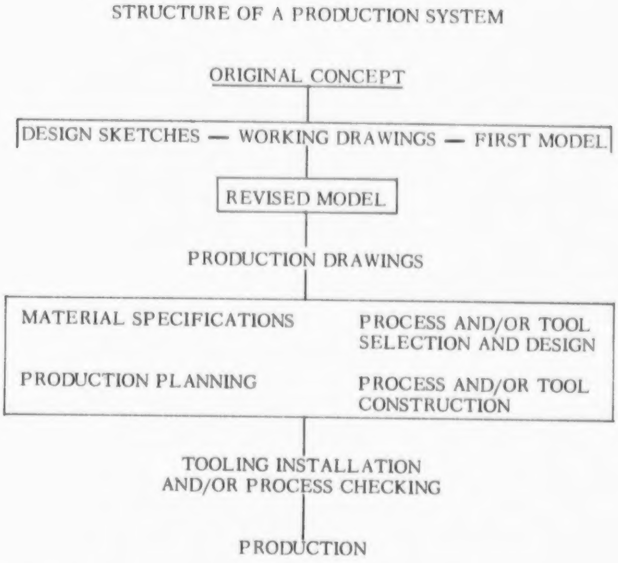
STRUCTURE OF A PRODUCTION SYSTEM
ORIGINAL CONCEPT
DESIGN SKETCHES — WORKING DRAWINGS — FIRST MODEL
REVISED MODEL
PRODUCTION DRAWINGS
MATERIAL SPECIFICATIONS
PROCESS AND/OR TOOL SELECTION AND DESIGN
PRODUCTION PLANNING
PROCESS AND/OR TOOL CONSTRUCTION
TOOLING INSTALLATION AND/OR PROCESS CHECKING
PRODUCTION

Figure 2

With questions such as these in mind, consider which of the many alternatives are applicable to your particular problem and its solution. After obvious decisions have been made, the process of careful planning through the use of abstract symbols should be pursued, using the symbols standardized by the American Society of Mechanical Engineers ○ D □ ▽ ⇨ to carefully plan the process flow as it proceeds through the facility. This can also lead to facility design involving critical abstract thinking, organizing, and predicting.

SUMMARY

The purpose of such a program is not to train or turn out skilled craftsmen, but to produce an involved, thinking, analyzing, organizing student—one who has knowledge of those industrial processes and activity areas common to today's model of industry, yet is prepared to understand and accept change as a way of advancing in a technological environment—one who accepts the fact that his life and his career are constantly in process. Changing is self-renewal, and mobility is the by-product of his creative endeavors in a technological world.

Mr. Campbell is a classroom teacher at the Brady Middle School, Orange City Schools, Cleveland, Ohio.

Technology Through Manufacturing

William D. Umstattd

Our session this afternoon is organized for the purpose of discussing the technologies of manufacturing and how these could be integrated into the study of industrial practices in our respective schools.

To establish a point from which to proceed, technology needs a definition. A "logy" is a doctrine, theory, science, or body of knowledge, and "techno" is the practice related to that doctrine, theory, or body of knowledge. Therefore, the teaching of manufacturing technology would include the study of those practices which occur in the production of durable and non-durable goods at some site and taken elsewhere to be utilized or consumed. The manufacture of industrial products is achieved by applying the in-plant technologies of management and production by people trained to perform specialized functions within the manufacturing input-process-output system. Laboratory sessions can be designed to survey the gamut of planning, organizing, and controlling the pre-processing, processing, and post-processing activities from the recognition of a need to packaging and distributing the product. In some instances, creative industrial arts teachers have devised strategies to teach manufacturing practices. However, the majority of the in-school instructional thrusts in this direction have resulted from the adoption or adaptation of the packaged instructional systems produced by research and development activities sponsored by the local school systems as well as teacher training institutions.

In implementing such a program, the deviation from a traditional material-centered approach may be an asset or a liability. It is an asset if the pupil leaves the laboratory mulling over R & D or role-playing simulations of problems confronting the manufacturer and consumer. The liability may come from parents or other industrial arts teachers who expect some decorative and/or functional object, which they may or may not need, to be taken home periodically. Even this requisite can be maintained to some degree by teaching proprietorship concepts which can evolve into custom production. Another procedure would be to teach the research and development phase of manufacturing leading to the development of a prototype. Both phases of the instructional program would require the student to build objects.

The positive outcomes from these innovative approaches, which would provide children with a broader conceptual understanding of how goods are produced and serviced, have been making their way into the newspapers and other media as viable practical activities necessary for the education of boys and girls. This means publicity, and from publicity comes visibility, and from visibility comes recognition that something is happening to up-date and improve our programs to reflect modern industrial practices. If this seems impractical, consider what notoriety has been received through interscholastic sports, drama, musical programs, etc.

Teachers who utilize these innovative manufacturing instructional materials are beginning to be identified by what students are learning rather than what they are doing or making. This position may be illustrated by the increasing amount of recognition and financial support from local manufacturers' associations.

Effectiveness of other educational disciplines in our schools is determined by measuring what the students learn. Therefore, with the knowledge of conceptual analysis and content of manufacturing technology as our academic value, we now have a much more relevant opportunity to demonstrate our accountability for educating children.

Many school administrators have considered reducing their conventional industrial arts course offerings because of the disproportionate program maintenance costs compared to the perceived educational value. Attitudes toward work may also be reflected in this programatic deterioration. In urban areas inhabited primarily by blue-collar workers, industrial arts supervisors have reported that youth are rejecting the project method of instruction. Students' behavior may be reflective of attitudes maintained by their parents, as reported in a recent government publication:

> There is convincing evidence that blue-collar workers are carrying their work frustrations home and displacing them with extremist social and political movements or in hostility toward the government. For others, apathy is the reaction to the same set of social circumstances. (1,p.25)

Yes, there is managerial discontent, also. Lack of influence on organizational decision-making, lack of authority, and insufficient resources with which to make judgments they are expected to carry out.

Such frustrations have an effect on the physical as well as mental health of personnel in industry. Work satisfaction has been shown to be a predictor of longevity (1, p. 62). Heart disease is reported to be the result of certain high-risk factors: job dissatisfaction, low self-esteem, occupational stress, excessively rapid and continuous change in employment, incongruity between job status and other aspects of life, certain personality characteristics, and lack of stability, security, and support in the job environment. (1, p. 63)

The alternative to heart disease in workers who succumb to high-risk environmental factors is mental illness, which often precedes physical illness. The worker may be unable to cope with his environment and exhibit sabotage, violence, alcoholism, drug abuse, etc. We need to develop activities to simulate these problems, which include knowledge of factors which deter these illnesses as educational goals.

In Work in America, a report of a special task force to the Secretary of Health, Education, and Welfare, the following statements are made:

> In our exploration of the interrelationships between work and education, the following shortcomings became evident:
>
> 1. The market value of education has driven out other values. One consequence of this has been to require, needlessly, ever-higher credentials for the same job.
> 2. Jobs have failed to change in step with the increased educational attainments and concomitant aspirations of the new work force.
> 3. Vocational education in the high schools has failed to give students useful skills or place them in satisfying jobs.
> 4. We have largely neglected the educational needs of older workers.
> 5. The schools themselves are a workplace influenced by, and influencing, other workplaces. As such, the schools would benefit from a redesign of their work.
> 6. The high schools have not yet discovered a proper role for themselves to play in "career education." (1, p. 65)

The academic question resulting from an analysis of these shortcomings is whether industrial arts educators can develop and implement adequate educational experience to counteract the identified work-related social problem. Needless to say, we must draw upon the professional contribution of colleagues in other disciplines such as sociology, psychology, economics, and business administration.

Industry is trying to meet its challenge of worker satisfaction by redesigning jobs according to these factors: occupation and status, job content, supervision, peer relationships, wages, mobility, working conditions, and job security.

Solutions to problems created by these factors may be accomplished by reforms and innovations in the workplace, such as autonomous work groups, integrated support functions, challenging job assignments, job mobility and rewards for learning, facilitative leadership, managerial decision information for operators, self-government for the plant community, and congruent physical and social context. (1, pp. 78, 79)

From 30 cited research supported documented in Work in America, some examples which substantiate these solutions are:

1. In 1959 the Polaroid Corporation was faced with the problem of increasing the meaningfulness of work among 2000 production line employees. With retraining, these personnel were rotated between their factory and other non-factory jobs. Employees became easier to recruit and absenteeism and turnover decreased. (1, p. 151)
2. Texas Instrument approached the problem of better utilization of human resources among 600 women assemblers by having them establish their own production goals. Assembly time dropped from 138 to 32 hours. Time off the job, turnover, and absenteeism decreased. (1, p. 152)
3. The Monsanto Chemical Company, Textile Division, in Pensacola, Florida, was faced with the problem that rising production costs had beset the expected savings of installing an automated control room for chemical reaction and conversion. An employee task force from each of four shifts restructured certain jobs and eliminated other jobs, especially the dirty ones, by automation. Employee suggestions increased 300%. (1, p. 155)
4. In 1971, Pet Foods Plant in Topeka, Kansas, was confronted with frequent shut-downs, costly recycling, and low employee morale. The satisfaction for the employees came in the form of

> incentive pay for the number of jobs each of the 70 workers could perform, rather than what he did at a particular time. The group was able to plan the operations in this new plant with 70 people rather than 110 as engineered. (1, p. 151)

These strategies involve rather unconventional assignments of production workers and have been referred to as "employee enrichment programs." Enrichment and the flexible involvement of workers within a conceptual framework of personnel technology appear to be one answer for many of the woes in manufacturing management and production technologies. These same resolutions also may be effective in our program at the secondary and collegiate levels.

Those who are teaching manufacturing and incorporating the innovative manufacturing, production, and personnel technologies as illustrated in this report are well aware of the energy and resources to be expanded in making the system function efficiently and effectively. Instructors, supported by their supervisors, who have experimented are to be applauded for their personal and professional contributions.

REFERENCE

Work in America – Subcommittee on Employment, Manpower, and Poverty of the Committee on Labor and Public Welfare, United States Senate. Feb. 1973, GPO89-1930.

Dr. Umstattd is an Assistant Professor of Education, The Ohio State University, Columbus, Ohio.

Classroom Teachers Organize a Manufacturing Activity

Harold G. Gilbert

There are many values of attending an international conference like this American Industrial Arts Association meeting in Atlantic City. Presentations at meetings bring out new ideas and information that can be used to update teaching materials. Informal discussions with people provide opportunities to seek solutions to current problems. Observing commercial exhibits and talking with the sales representatives give an insight into available teaching materials.

Last year in Dallas, the latter was most important for me. I observed the display at the Tandy Leather Company booth and talked with Carson Thompson, their Merchandising Manager. We discovered a mutual interest in school children studying about leather die cutting and manufacturing, in addition to the current work being done with leather decorating. The latter work was very good, but in addition the schools need to give a better picture of developments in the leather industry. We both left the convention thinking about how we could help teachers accomplish this worthy goal.

Last summer I had the opportunity to visit the Tandy Leather Company factory in Fort Worth, Texas, to see leather manufacturing first-hand. After this visit, Carson and I talked for two days about the development of teaching materials.

One obvious need for teachers was a comprehensive compilation of resource materials about leatherworking. There are many texts, film strips, slides, resource units, charts, and other aids available from all parts of the country. It would be invaluable to put all this information and reference material together in one "encyclopedia" of leather. Carson had already embarked on this project, and he has the contacts to do an excellent job.

The other primary need seemed to be information to help teachers go further than teaching about the decoration of leather. The latter activity is good for a start to get the students to appreciate the characteristics and value of leather as an essential material. Those who derive enjoyment can continue the work with leather as a fascinating material. However, not many teachers use leatherwork to show the industrial application. The United States Department of Commerce in 1970 published a reference called Industrial Profiles.[1] It listed the 100 largest industries in the United States in terms of employment.

Food preparation, textiles, and metalworking were at the top of the list. The twelfth largest was leather manufacturing, which employs over 300,000 workers. The activities of decorating leather used by most teachers do not begin to reflect these sizable manufacturing processes.

Carson and I planned some teaching resource materials that could be used for the K-6 grades, others for the middle school, and some for the high school. Carson had already gathered materials that teachers have used successfully at these levels. The highlights of the projected program are:

Elementary level:
1. Introduction to leather decorating (stamping) and tanning
2. The use of leather by pioneers and Indians
3. Die cutting as an essential in factory production
4. Mass production of leather goods

Middle school:
1. Design and make leather goods decorated by carving and dyeing
2. Design and purchase a die for mass production of a leather object
3. Develop leather carving as a hobby (design and make own stamps)

High school:
1. Procure raw leather and tan it for own use
2. Design and make a steel rule die to cut leather
3. Develop skill in decorating leather as a hobby

At each of the three levels there is basic information about career opportunities in the leather industries. With the emphasis described by Dr. Harney, this becomes another important reason to emphasize the job operations and employment opportunities in the leather industries. The emphasis on leather manufacturing at the elementary, middle, and high school level makes industrial arts and career education synonymous in this aspect.

This Spring, as part of my sabbatical study while employed by Northern Illinois University, I started the expansion of the teaching resources for the elementary level. The essential point here is that the start was made by working with industry to get information on what they are doing. They also contributed teaching materials in the form of kodachrome slides, pictures, pamphlets, and samples of materials. Most important was the tour of the leather factory and conferences with personnel who could explain the details of the operations.

Several possibilities were considered for the use of the resources: undergraduate teacher education courses, graduate teacher education courses, in-service workshops, articles for professional magazines, and a resource kit for classroom use. After discussion of each, it was decided the kit of materials would be the best starting point at the elementary school level.

Characteristics of this teaching kit should be:
1. Practical for classroom use, even by teachers without technical experience
2. "Hands-on" or construction activities for children to motivate learning
3. All the tools, materials, and teaching resources needed for the unit
4. Teacher directions, including ideas for correlation with other work
5. Inexpensive enough for schools to purchase
6. Flexible in the amount of time a class might devote to the unit
7. Brief instructions the teacher might use for planning
8. References and resources for expansion of the unit

While on sabbatical, I wrote the units on Introduction to Leatherwork and on Leather Manufacturing. These were edited by Janet Rabe, an industrial arts consultant in Fort Lauderdale. After revision, the kits were given to two third grade teachers who used them in their classrooms. They were revised again, and a copy of the instructions to teachers is available at this meeting for those who want one. It is planned that the Tandy Leather Company will package these kits for purchase by schools in the near future.

The next step is to develop two more kits for the elementary level and then consider the development of materials for the middle school and high school. Some of the equipment developed by me for die cutting is on exhibit here. This will be expanded and tested further.

The main purpose of this description is to show how the leather industry was instrumental in supporting the development of teaching resources. It is hoped that other teachers will work on materials to develop career awareness of other industries. Perhaps if this is coordinated and disseminated through the American Industrial Arts Association, it will speed the development of materials representing all of industry. The professional publications of this organization could possibly serve this purpose.

FOOTNOTE

(1) Industry Profiles, 1958-1968. United States Department of Commerce. Superintendent of Documents, United States Government Printing Office, November 1970, 297 pp.

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Research and Development in the Industrial Arts Classroom

Ralph Pandolfi

Research and development is at the knife edge of technology, cutting a path into the future by solving the problems that lie at and beyond the frontiers of our present level of technology. The people involved in research and development are, in many ways, the elite of industry. They must be a special breed who, instead of finding reasons why something cannot be done, find the way to do it. Their philosophy can aptly be described by quoting Robert Kennedy's paraphrasing of George Bernard Shaw:

> Some men see things as they are and say, why. I dream things that never were and say why not.

Research and development, or more simply stated, R & D, plays an important role in our industrial society, where it transforms pie-in-the-sky ideas into reality. The dream several decades ago of transmitting moving images by radio waves anywhere in the world has become the reality of today's transworld and transcelestial television.

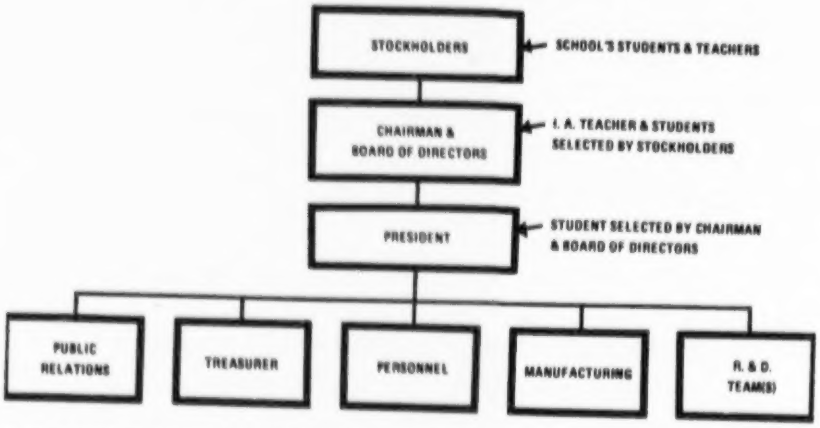
A panel of experts at the Rand Corporation looking to the future predict that we will have artificial organs made of plastic and electronic components by 1983, mining of the ocean floor by 1990, and direct electromechanical interaction between the brain and a computer by 2010.[1] The times indicated are approximate dates, with about half of the experts predicting an earlier date and half predicting a later date. But if we learn from our past experiences, we can expect these dates to be on the conservative side. Based on this prediction, there will probably be mining of the ocean floor before 1990 and electromechanical interaction between the brain and computer before 2010. Alvin Toffler writes in Future Shock that, "The Japanese already extract 10,000,000 tons of coal each year from underwater mines; tin is already being ocean-mined by Malaysia, Indonesia, and Thailand" and "... Dr. R. M. Page, Director of the Naval Research Laboratory in Washington, has publicly dicsussed the feasibility of a system in which human thoughts are fed automatically into the storage unit of a computer to form the basis for machine decision-making."[2]

As we ponder these science fiction-like projections into the future, we should keep in mind that the teenager of today will be in his early forties when most, if not all, of these predictions become a reality, and at that age he will have contributed approximately twenty years of his working life to some facet of our technological society.

The question must then be asked, "Do we, as industrial arts teachers, want our students to have played an important role in forming the future, or do we want them instead to have been passive viewers of our unfolding future technology?"

The answer should and must be that we want them to take an active part in determining what our future world will be like. One obvious way to do this is to make research and development a key part of our industrial arts curriculum.

Figure 1. A Sample Classroom Corporation


STOCKHOLDERS
SCHOOL'S STUDENTS & TEACHERS
CHAIRMAN & BOARD OF DIRECTORS
I. A. TEACHER & STUDENTS SELECTED BY STOCKHOLDERS
PRESIDENT
STUDENT SELECTED BY CHAIRMAN & BOARD OF DIRECTORS
PUBLIC RELATIONS
TREASURER
PERSONNEL
MANUFACTURING
R. & D. TEAM(S)

THE FUNCTIONS AND STRUCTURE OF INDUSTRY

We will start by taking a superficial look at the functions of industry and a typical classroom corporate structure, and then a more detailed look at the make-up of the R & D organization within that structure.

Functions of Industry

Industry has been described as the organization designed to produce and service products to meet the material needs of man. More specifically, the six functions[3] of this organization are—Organization and Management, Research and Development, Planning and Production, Production, Distribution and Sales, and Service.

R & D Organization

A sample corporate structure, which may be used in the classroom, is shown in Figure 1. Focusing on the R & D block, there are two basic types of R & D groups: the functional and the product line organization. In the functional organization, specialists in the same area of technology work together on problems related to their specialty. An obvious advantage is that there is a concentration of a particular expertise in one group; a disadvantage is that there is no opportunity for cross-discipline communications. In a product line organization, each group is made up of specialists from different areas of technology working together to perform research and development tasks for one product or product line. An advantage accruing from this arrangement is that one group has the responsibility for a product's total research and development, instead of the responsibility being spread among many groups.

Because the students in the typical IA classroom have few if any specialties, it is best to organize the student R & D teams along product lines; that is, each team researches and develops its own product. For example, one team might working on model rockets, while another is developing a new chair design. An advantage of the product line approach in the classroom is that each student can learn about R & D while working on something that is appropriate to his skills and interests.

R & D PROCESS

Stripped to its barest essentials, the R & D process (Figure 2) starts with a request from the corporate officers to conduct market research in order to determine the feasibility of producing and selling a particular product. If the market research indicates that the proposed product has a good chance of making a profit for the company, operating specifications are written. The operating specifications state the requirements of the new product and the constraints within which the people in R & D must operate. A few

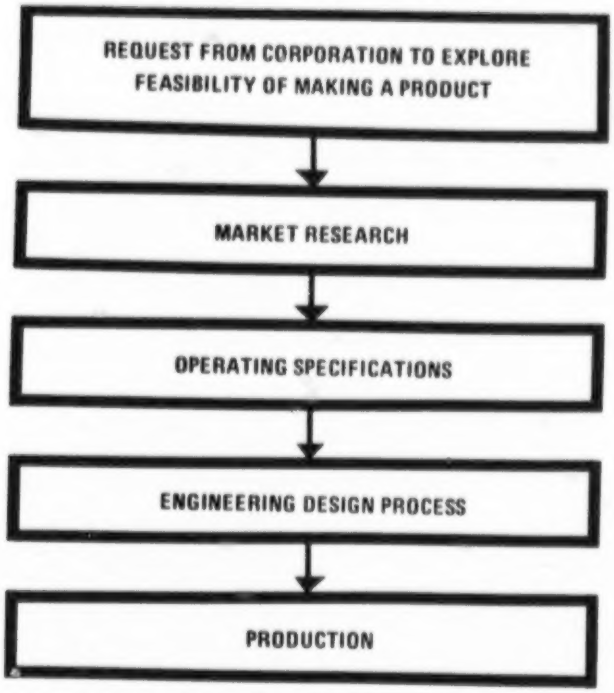

REQUEST FROM CORPORATION TO EXPLORE FEASIBILITY OF MAKING A PRODUCT
MARKET RESEARCH
OPERATING SPECIFICATIONS
ENGINEERING DESIGN PROCESS
PRODUCTION

Figure 2. The R & D Process

typical constraints are money and labor allotted to perform the R & D operation, functional and visual requirements of the new product, and a time deadline.

The researchers then perform the engineering design process, culminating in a product design and often a production model, plus the specifications which the production people must follow in bringing the product from the model stage to the mass production stage.

Going back to elaborate on each of the steps in the R & D process, we find the following:

Market Research

The market researchers make their recommendations to the corporation by considering what might be called the 5 C's of market research: Consumer needs, Competition, Cost of the proposed product compared to that of the competitor, Condition of the market place, and the Company's production capabilities.

The market researchers investigate these five areas by polling their potential customers, looking at predictions of the market's future economic conditions, consulting with their company's production people, looking closely at what the company's competitors are doing, and sometimes using such unscientific methods as guesswork and hunches.

Operating Specifications

Depending principally on the size of the R & D project, the operating specifications might range from just a few pages in length to several volumes. In either case, they should include at least the following items: general description of the item to be researched and developed, time and personnel available, money allotted for work, maximum production unit cost, number to be produced, visual requirements, functional requirements, and size and weight limitations.

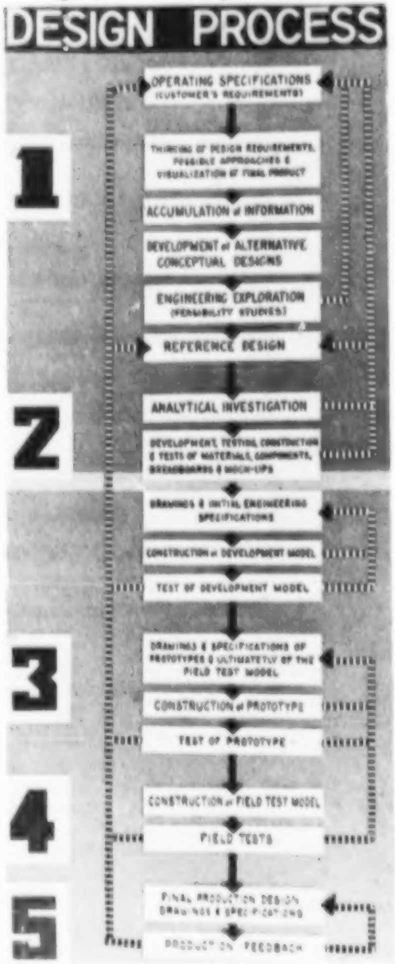
Engineering Design Process

The design process (Figure 3) can be broken down into five major steps: initial exploratory studies, tests of initial findings and the development model, drawing and making of a prototype, construction of a field test model, and finalization of the production design.

While this chart may give the impression that the steps in the design process are absolute and discrete, this is not the case. The steps are part of a continuum with much overlapping between stages. Furthermore, there is a great deal of feedback involved, so that it is often necessary to return to earlier stages to adjust for additional inputs found at later stages.

After fulfilling the requirements of the operating specifications, the R & D team submits the final design (usually consisting of a production model and a set of drawings) to the production people, and preparations are made for mass production. Production problems may arise which necessitate going back to an earlier step in the R & D process to make design changes.

Figure 3. The Design Process


DESIGN PROCESS
1
2
3
4
5
OPERATING SPECIFICATIONS (CUSTOMER'S REQUIREMENTS)
THINKING OF DESIGN REQUIREMENTS, POSSIBLE APPROACHES & VISUALIZATION OF FINAL PRODUCT
ACCUMULATION of INFORMATION
DEVELOPMENT of ALTERNATIVE CONCEPTUAL DESIGNS
ENGINEERING EXPLORATION (FEASIBILITY STUDIES)
REFERENCE DESIGN
ANALYTICAL INVESTIGATION
DEVELOPMENT, TESTING, CONSTRUCTION & TESTS OF MATERIALS, COMPONENTS, BREADBOARDS & MOCK-UPS
DRAWINGS & INITIAL ENGINEERING SPECIFICATIONS
CONSTRUCTION of DEVELOPMENT MODEL
TEST OF DEVELOPMENT MODEL
DRAWINGS & SPECIFICATIONS OF PROTOTYPES & ULTIMATELY OF THE FIELD TEST MODEL
CONSTRUCTION of PROTOTYPE
TEST OF PROTOTYPE
CONSTRUCTION of FIELD TEST MODEL
FIELD TESTS
FINAL PRODUCTION DESIGN DRAWINGS & SPECIFICATIONS
PRODUCTION FEEDBACK

SIMULATING R & D IN THE IA CLASSROOM

A good simulation experience, based on the functions of industry described in this article, should start with the organization of a classroom corporation and proceed through the previously-mentioned five functions, culminating in the servicing of the product.

Described here is a suggested R & D classroom simulation based upon a project conducted in a K to 8 school, the Lowell School in Philadelphia. The students who performed the research and development were 8th graders; there were one girl and six boys on the R & D team. The project involved the finishing of decoupage wall plaques (Figure 4) and was selected as an example of Research and Development for the following four reasons:

1. By keeping the subject of the R & D simple, greater emphasis can be placed on techniques of R & D.
2. The work is such that it can be done with simple hand tools and, if necessary, in an ordinary classroom.
3. Because most IA teachers, no matter what their discipline, are familiar with wood finishes, the project should appeal to a wide range of teachers.
4. The finished wall plaques are a very saleable item and lend themselves well to mass production, sales and distribution and, to a lesser degree, service.

The fall preceding their excursion into R & D, the students had made decoupage wall plaques and sold them to friends, family, and teachers at a Christmas Bazaar. Although it was generally agreed that the plaques were very attractive and a fair amount were sold, they did not sell as well as had been expected. The students wanted to make more plaques and sell them at the school's May Fete. With the encouragement and guidance of their instructor, they organized a mini-corporation, issued stocks, and undertook an R & D effort to investigate the following four areas:

1. Because there was some resistance to the price they had charged (prices ranged from four to eight dollars), how much should they charge for the plaques?
2. What color would sell best?
3. Lacquer had been used and, because of its strong odor and difficulty of application, they wanted to find another good finish that was easier to apply and had less of an odor.
4. Would local stores be willing to sell their plaques, possibly on a consignment basis?

The corporation officers, with the help of their instructor, selected several student teams to do the research necessary to find the answers to the above questions. A market research team comprised of two students developed a questionnaire and went into the neighborhood to ask questions about color preference and the amount people would be willing to pay for the plaques.

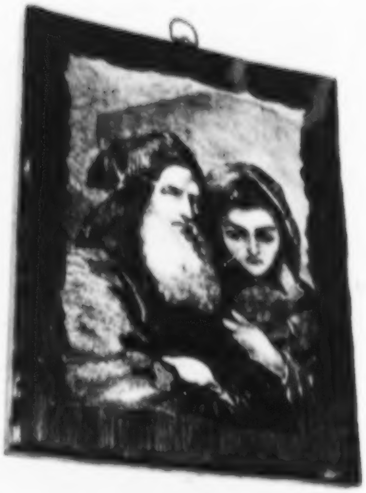


Figure 4. Decoupage is a method of attaching printed pictures to flat pieces of wood and then applying several coats of a clear finish so that the picture looks as though it was painted on the wood.

Another market research team went to local businesses to determine whether they would sell the plaques on a consignment basis. A third team tackled the problem of appropriate finishes. They decided that the important criteria should be ease of application, abrasion resistance, water resistance, and the visual appeal of the finish. By referring to books, pamphlets on finishes, and by consulting with their instructor, they decided to test the following finishes: lacquer, shellac, varnish, and a commercial decoupage finish, Aqua-Podge.

The students cut four pieces of 1 x 10-inch pine into 12-inch-long pieces. The wood was stained with Min-Wax and, after allowing it to dry overnight, paper prints were fastened to the wood with white glue. Again they waited 24 hours and gave each of the four wood samples three coats of one of the four finishes.

As the finishes were applied, the students noted in an evaluation table how easy the finishes were to apply, how long the application process took, and how much of an odor each produced.

To test the samples for their abrasion resistance, half of the face of each sample was masked off with paper and pulled several times across a one-inch layer of sand (Figure 5). The paper which shielded one side of the finished surface from the sand was removed, and the shielded and unshielded parts of the surfaces were compared. The samples were then tested for water resistance by placing a damp paper towel on half of the finished surface and allowing it to remain there for 24 hours. The part of the finish exposed to the water was compared to the part that was not exposed. The abrasion and water resistance data was added to the evaluation table.

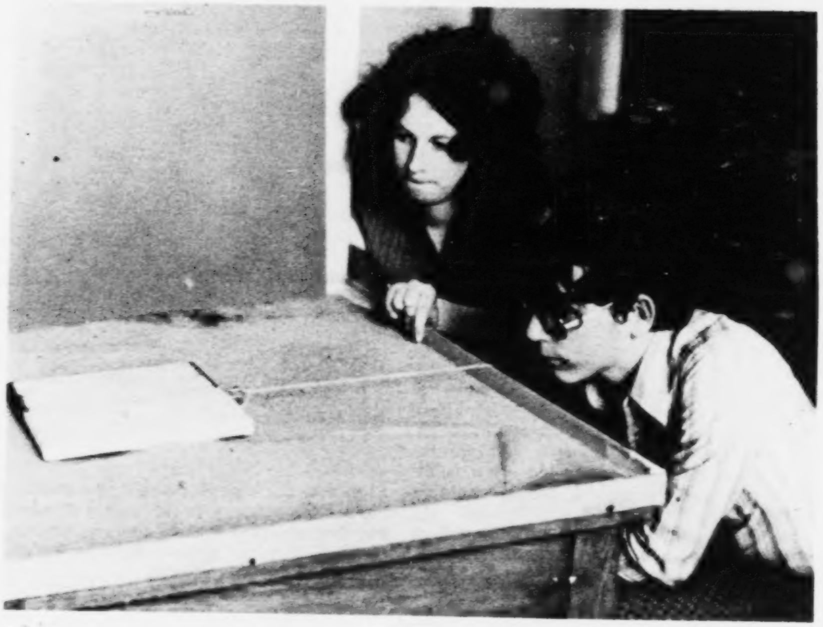
To determine which finish had the most visual appeal, samples of each were displayed in the school's main hallway, and passing school personnel were asked which finish they liked. Their responses were added to the evaluation table.

Having completed their market research and the evaluation of the four finishes, the R & D teams prepared their findings and submitted them in the form of a short written report to the corporation officers. A brief conference was held with the corporation officers and the R & D teams; the following conclusions were reached.

RESULTS OF THE CLASSROOM R & D

Although Aqua-Podge was not as water- or abrasion-resistant as some of the other finishes, it was very easy to apply and almost odorless. Furthermore, because of its

Figure 5. Lowell students testing a finish for abrasive resistance.



water solubility when wet, it was not necessary to use strong-smelling or dangerous solvents for clean-up. It also scored well on its visual appeal. It was decided, therefore, that Aqua-Podge was the best all-around finish. Olive was the most-liked color, and three to five dollars seemed to be an acceptable price. Of the two local merchants contacted regarding selling the plaques on consignment, one responded favorably, while the other's response was negative.

With their questions answered by the work they had done, the students were finished with the R & D phase of their product and were now ready for production.

The students made about 40 plaques and sold most of them during and after the school's May Fete. Sales were very good, and it was not necessary to sell any through local merchants.

With a total of about $200 in their checking account from this and previous mass production activities and with a loan from the principal, the students were able to pay a dividend on the stocks purchased and also buy a $260 reel-to-reel tape recorder for use in the industrial arts lab.

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MATERIALS

Solving Urban Problems Through Curriculum in Space Technology with New Materials and Processes

Rayford L. Harris

The National Aeronautics and Space Act of 1958 declared that it was the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind. The 1958 act included such goals as "the expansion of human knowledge," "long-range studies of the potential benefits to be gained and the problems involved in the utilization of aeronautical and space activities for peaceful and scientific purposes," and "the most effective utilization of the scientific and engineering resources of the United States."

The space age is scientifically precocious – barely more than 15 years old. The basic purpose of scientific research and advanced technology is long-term gain, but a striking aspect of space research is that short-term dividends already are being realized, despite its strong orientation to the future. Already the voices of conservationists and others who are concerned with the problems of improving the quality of life in an industrial society are counseling a turnabout in the exploitation of our natural environment.

Far from decrying the condition as an occasion for pessimistic withdrawal from the realities of the problems that must be solved to better the plight in our urban society, we must advocate that technology be directed toward the solution of such problems. Out of this realistic concern with the constraints of our physical world can come new insights into scientific and technical knowledge, and with this knowledge will grow the demand for new jobs and careers for persons with technical and scientific education. There are broader, though less visible, benefits in the scientific and technological advances gained in the pursuit of the basic aims of space research.

The product is knowledge – man's greatest asset – knowledge of the universe, the mechanisms at work within it, and our planet earth. Some of the new knowledge acquired by space exploration has no immediate applicability, although some day it may have. A great deal of the knowledge, however, is immediately transferable to practical use. Although not an overnight process, this already has reached consequential proportions.

It is clear that there are many aspects of the proper selection and utilization of new materials that have found particular applications in materials technology brought about by what is termed "spinoffs." New products, materials, and processes, have come into existence as a result of space research and development and have quickly found application in non-space activities.

NEW MATERIALS AND PRODUCTS

New products are available, ranging from household items like lightweight indestructible frying pans to the more complex discoveries in new medical equipment and techniques enabling doctors and hospitals to give better treatment to patients. Clothing, for example, worn by the astronauts has led to the use of an existing fiber that can be woven into a specially-designed texturized fabric and tailored according to a new concept in undergarments that designers are now manufacturing. Other consumer products in this area include special blankets, sleeping bags, sportsman's apparel, superinsulating vacuum-metalized nylon that is heat reflective, yet porous and machine washable. Bed covers, draperies, tents, and awnings are being developed.

A new type of pipe, built of plastic mortar reinforced with fiberglas is light, thin-walled, non-corrosive, and virtually indestructible. A polyurethane spray foam is used to insulate the hulls of tuna ships. An aluminized plastic 0.0005-inch thick becomes an emergency blanket.

An electromagnetic hammer is used to build ships and autos. The prodigious research, development, and manufacturing efforts harnessed by government – under the terms of the Space Act – has spawned many tools useful to mankind and placed at man's disposal new technology which will be applied here and abroad to produce novel and better products for society.

MATERIAL APPLICATION

A portable brazing furnace coming into increasingly widespread use for commercial metal fabrication is a direct offshoot of rocket propulsion work by aerojet, developed by General Corporation to perform reliable brazes on tubing in the spirits of liquid rocket engines. Aerojet engineers developed a tool using tungsten filaments in enclosures to supply uniform, intense, closely controlled heat in concentrated patterns.

A high-temperature plastic researched and developed by Westinghouse Electric Corporation has resulted in a new family of co-polymers that have outstanding strength at temperatures up to 650° F.

HOME BUILDING

Space research is affecting the home owner on a broad scale. Fire-resistant paints and building materials are two of the most widely used by-products of space technology to reach the consumer.

A new system of wiring a building for electricity is another innovation. Instead of punching holes in walls to run internal cables to bulky switch boxes, the space agency is testing a "flat conductor cable" which can be stuck to a wall like adhesive tape. After painting the wall, the cable is difficult to detect or see. The wiring is connected to a low-voltage switch box which is also glued to the wall. Experts say this system could cut in half the cost of wiring a building or having electrical repair work done.

If we are to build the new cities and new towns in cities which urban planners are discussing, some pretty advanced construction techniques and materials are required. The real question, however, is: What will it take to build these towns and cities? There are many aspects to the proper selection and effective utilization of materials for a successful structure design, particularly one for severe environmental conditions.

New exotic materials emanating from space technology, such as titanium, beryllium, carbon, and special glasses, offer many design possibilities. On a high order, we have several new material mixtures, called composites, which are strong yet lightweight and able to withstand severe load, temperature, and corrosive conditions. These, too, are developments necessitated to meet requirements of high-speed aircraft and space vehicles. Composites, in fact, are seen now to approach dream materials with tailor-made properties.

To reduce the cost of housing without sacrificing quality, livability, and attractiveness, the Defense Department has contracted with General Electric's Re-entry Systems Organization at Philadelphia and a California architectural firm to apply new concepts of residential construction to the development of family housing at George Air Force Base, California. Neighborhood planning, architectural design, and plans for manufacturing and erection are being developed.

Attacks on some of the problems posed by urban poverty and cultural gaps, particularly the barriers to education, have been mounted by Lockheed Aircraft Corporation in support of the State of California.

Under the direction of the State Department of Compensatory Education (which, as the name implies, tries to compensate for cultural and economic drawbacks), a team of Lockheed systems engineers and analysts assisted in an intensive study of school-community relations in urban poverty areas. Findings showed that the success or failure of schools to educate youngsters with ethnic, cultural, or economic handicaps can be a major contributor to either contentment or unrest in the modern city.

These discoveries and experiments are not just vague possibilities for a distant tomorrow. Although unplanned and often unforeseen, they are nonetheless real. All are based on existing or impending technological capability. They are, in fact, extra dividends which are a fallout of the application of space experience by business, industry, commerce, Government, the medical profession, and the academic community.

Those dividends already paid, coupled with those in sight for the near future, affect practically every facet of human convenience and concern. They promise continuing and increasing return on the space investment for the benefit of mankind on earth today.

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Bringing Industry and Industrial Arts Together

Lee D. Carter

Industrial arts education is indeed a unique and fascinating area of the educational spectrum, and we in the field are extremely fortunate to have outstanding backing and support from industry. There is no subject area in our educational system that can do a better job of interpreting industry to students than an industrial arts-oriented curriculum. Industry realizes this and is very willing to provide us assistance in the classroom so we can do a better job of teaching our students about the products, processes, services, and systems of industry.

As I have traveled our state for several years, I have observed that many of our teachers at the elementary and secondary level have been lax in contacting industry regarding materials and assistance they might obtain to assist them in doing a better job of relating to the world of work, processes, techniques, new applications, and career opportunities in industry. I have noted that any instructor who is resourceful and willing to take the time can really obtain a wealth of valuable information and assistance from industry for the asking. I believe that we, as ambassadors of industry in the classroom, have a definite responsibility to both our students and industry to provide as broad a background as possible relating to occupational information for our students and also allow them some "first-hand" concrete experiences involving many different processes, methods, applications, services, and systems of industry. I believe we, as educators of industrial processes and industry, must work hand-in-hand to give our students a first-hand knowledge of our industrial society.

As we are mainly concerned today with the career awareness approach relating to industry at the elementary level, I will try to zero in on various techniques, sources, and materials that pertain to this age level and confine it basically to the leather industry, so it will have direct relationship to our past three presentations.

I believe we, as educators, are remiss if we approach industry solely for financial assistance instead of assistance in the form of materials, technical assistance, field trips, observation tours, etc. Due to the substantial amount industry now pays in taxes toward the educational field, I believe they will be much more willing to cooperate and have much more to offer in numerous other forms of assistance than merely a financial reward. We, in the area of industrial arts education, are well aware that the least effective means of communication is the lecture method. Numerous studies in education have indicated that about 10% of what we learn is by hearing, 40% is learned by seeing, and 50% is learned by doing. Consequently, industry has found that A-V aids, instructional and related materials, and first-hand "on-the-job" observations are the best techniques for relating their particular role in our industrial society to students in the classroom.

In preparing for this presentation, I contacted several leather-related industries and companies who were willing to share their materials with me. In the area of audio-visual aids, I found a wide range of educational media which these companies are most happy to provide and share with teachers in the classroom. There are many types of visual aids available to educators from industry today. They include: filmloops, filmstrips, 16mm films, slides, bulletin board materials, overhead transparencies, self-learning packets, tape recordings, instructional charts, instruction "hand-out" sheets, industrial samples, and records.

One company that has done considerable work in providing A-V aids in the area of leather craft is the Tandy Leather Company. They have developed many of the aids I have displayed here. They include: single 8 film loops on leather sewing, tooling, modeling; charts – procedure and general information types; "How to do it" – pamphlets, brochures, and books; teaching packet on leathercraft, including transparencies, manual, and dupli-carve aid; related information pamphlet – leather knowledge; filmstrip and cassette on elementary leather in art; and course of study in leather tooling and carving.

The leather industries of America have been most helpful in furnishing display charts and related information on the leather industry for any elementary or secondary instructor teaching a unit or units involving the leather industry. Other companies I have found most helpful regarding the leather industry are the New England Tanners Club of Peabody, Mass., and the Hermann Oak Leather Company of St. Louis, Missouri. The USM Corporation of Boston, Massachusetts, also was very helpful in providing related information pertaining to manufacturing of leather goods.

The following are samples of materials available from some of these companies which would be most helpful in the classroom: Leather Facts — A Picturesque Account of One of Nature's Miracles; Tanning of Leather; Leather in our Lives; Dictionary of Leather Terminology; and How American Shoes Are Made.

Although industry is doing a terrific job of supplying us with excellent A-V aids, instructional and related information, and many other learning helps, there are still other avenues on which industry and industrial arts can work together. These include field trips to industry, mini-lectures by leaders from industry, exploring research work which is being disseminated by industry regularly, and industrial demonstrations at educational conferences.

Industry can also provide teachers in the classroom with valuable information relating to the current trends in the business, the new methods, techniques and processes being used, and the existing manpower needs. Leather manufacturing is the twelfth largest industry in the U.S. and employs over 300,000 workers. It behooves us to make our students aware of this and other industries by working hand-in-hand with industry and taking advantage of the tremendous amount of excellent teaching materials, technical assistance, and other helps they have available for the asking.

What I have attempted to show you in this brief dialogue is how we, in the education field, can use the materials of industry (the examples used have been related mostly to the leather industry) and how we can integrate these materials in developing a career awareness curriculum at the elementary level.

Mr. Lee D. Carter is the Industrial Educational Arts Supervisor, State of Idaho.

Glassmaking in the High School

Richard John Boyle

The purpose of this presentation is to show how glass can be manufactured on a small scale in a high school laboratory. The complete fusion of a mixture of finely divided sand, lime, and soda can only take place at a temperature between 1250°C and 1700°C, a temperature so high that iron glows with a dazzling bright yellow heat. Ordinary sources of heat, such as a bunsen burner, would not be intense enough, and an ordinary air-gas torch can only heat a very small volume of material to this temperature. During the process of fusion, gasses are produced. They can only escape from the glowing mass if it is maintained for some time at a temperature that causes glass to have the consistency of syrup. The process to be described involves heating about a spoonful of sand-lime-soda mixture to redness with a torch and then raising the temperature of the charge by electrical means so that it can be maintained at bright heat for as long as required.

Ordinary glass is a mixture chiefly of silicon dioxide and the oxides of calcium and sodium in certain proportions. Calcium oxide or quick lime of high purity is readily available, but sodium oxide is not usually used as such but is provided by using sodium carbonate which decomposes into the oxide during fusion. Carbon dioxide gas is given off for a time, until the molten glass is free of bubbles. An endless variety of glasses can be produced by varying the kinds and proportions of the metal oxides used. Thus, if more lime is used in proportion to the soda, the glass melts at a higher temperature and is harder, while if a larger proportion of soda is used, the glass is softer and melts at a lower temperature. Crystal glass is made by adding lead oxide to the mixture, which produces a glass with more luster and greater ability to disperse the refracted light into colors of the spectrum. It has a lower melting point and is softer and more easily scratched than ordinary glass.

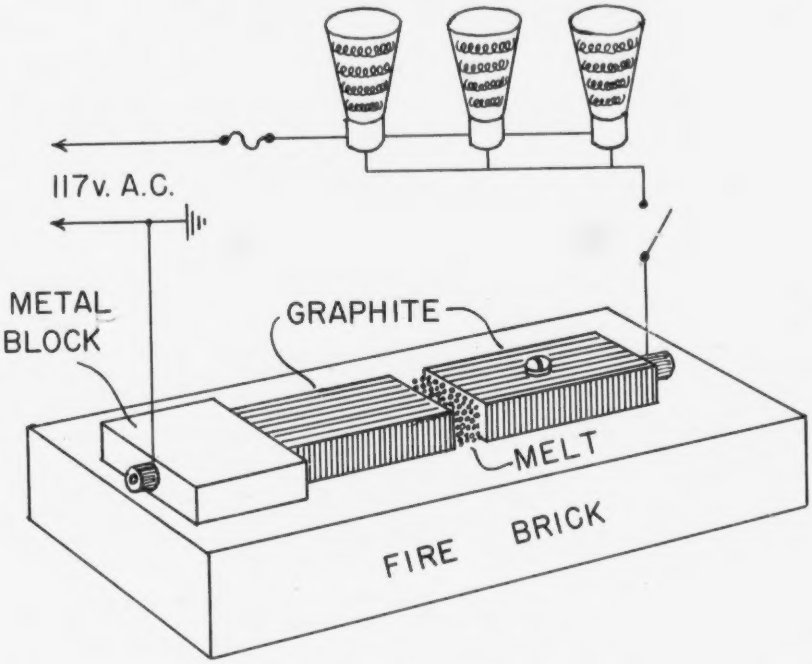
Unlike most other substances which have a more or less definite temperature below which they congeal or crystalize, molten glass passes continuously from a perfectly fluid state through stages of greater and greater viscosity as the temperature is lowered until it is so stiff that it behaves as a perfect solid.

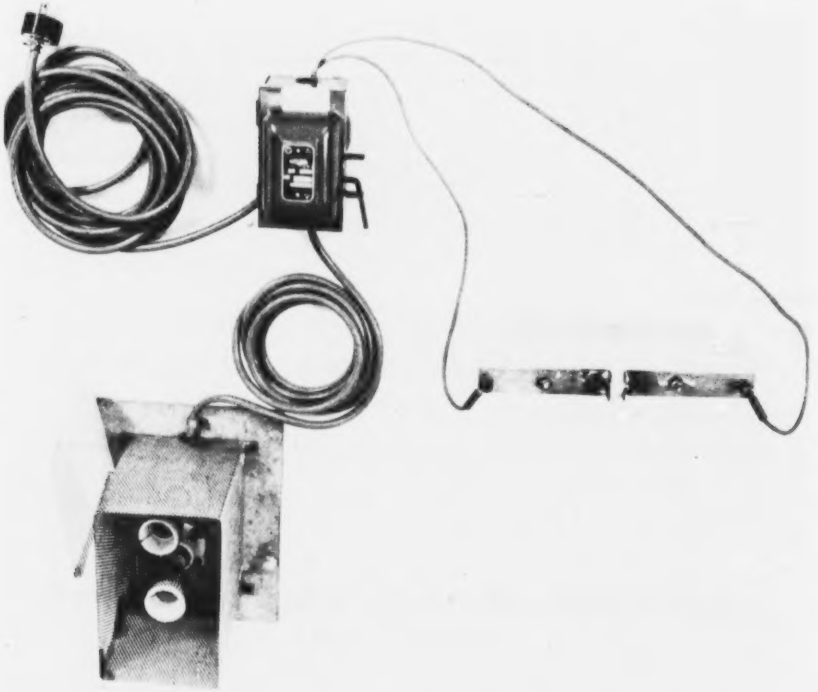
Glass is a very poor conductor of heat. This makes it more difficult to heat an entire batch of glass by applying heat on the outside. The interior of a mass of glass can be more efficiently heated by absorbing radiant heat than by the process of heat conduction from the outside. This is also true of transparent plastic, which is normally heated by the use of infrared lamps, and of food which can be heated throughout without scorching the surface by placing it in a microwave oven. In order to manufacture glass on a large scale, furnaces are used in which the whole interior glows at nearly white heat. Under these conditions, the transfer of heat to the entire mass of glass is more efficient.

Few high schools are fortunate enough to have kilns which can subject glass to the same degree of heat that exists in a reverberatory furnace. This method of heating has the obvious disadvantage that the whole process of fusion cannot be watched through all its stages. By using the method of electrical heating here described, it is possible to heat small quantities of glass to very high temperatures out in the open. This method takes advantage of the fact that when glass is red hot it conducts an electric current quite well at the voltage available when "house current" is used. It is first necessary to fuse the mixture with a torch so that a "bridge" of molten material forms between the electrodes. Then, as electrical conduction takes place, the heat soon spreads through the entire mass due to the internal generation of heat. At this point, further heating with the torch will not be required.

The electrodes are preferably made of graphite blocks each about one-half inch thick, about one inch wide, and at least two inches long. They are placed end to end on top of a fire brick with a gap between them which may be varied from about one quarter inch to about one half inch. The movable electrode should be connected directly to the grounded side of the line, while the fixed one is connected to the "hot" side of the line through a bank of two or three cone heaters connected in parallel. Since the cone heaters will be

MINIATURE GLASS FURNACE





Two 10-Amp heater cones are used instead of three 5-Amp cones. Stainless steel electrodes are substituted for the carbon ones which get "eaten away" in the process.

"hot" both thermally and electrically, they should be placed well away from the work area on a shelf or other inaccessible place. A heavy duty enclosed toggle switch connected between the hot electrode and the heater bank should be within easy reach. If the hot electrode is covered with a sheet of asbestos or similar refractory insulation, it will reduce to almost zero the possibility of shock danger to the students. If the heater cones each require five amperes, the line should be fused to carry twenty amperes in case the electrodes touch each other. The outer ends of the electrodes are drilled and tapped at least an inch deep so that binding posts may be attached which will safely carry a current of about 15 amperes. The simplest way to fasten the "hot" electrode to the fire brick is to bind it in place with a wrapping of iron wire around the brick. This will not affect the stability of the brick, which preferably should rest on a bed of sand in any case. After continued use, such a brick will get quite hot and the sand will also provide protection from bits of hot glass that could drop from the brick. The movable electrode may be attached to something heavy enough so that it will remain in place on the fire brick.

The charge of powdered material placed between the electrode consists of about 60% or more of powdered silicon dioxide (or finely divided sand obtained by pulverizing white sand and sifting it through fine mesh screen or nylon stocking material) together with 20% or more of calcium oxide and about 20% or less of anhydrous sodium carbonate. Experiments may be made to vary these proportions as well as to add lead oxide (litharge) and/or borax to lower the melting point. Many experiments may also be made to produce glass of various colors by using a variety of other metal oxides. For example, cobalt oxide produces a rich deep blue glass, zinc oxide imparts a yellow color, black copper oxide colors glass green, but copper sub-oxide or red oxide colors glass red or ruby, while iron oxide generally produces a green color.

The operator should not look directly at the electrically heated mass without the use of dark glass goggles because of the intense infrared light emitted. Very little ultraviolet is emitted unless the electrodes are separated enough to produce an arc across an air gap. A probe made of porcelain, quartz, or other ceramic material will be needed for distributing unfused material into the molten mass and to agitate the mass to hasten the release of gases. More mixture can be added to the molten mass because the final volume of clear glass will be less than the original volume of the powdered mixture. The probe will also be needed for withdrawing the clear molten glass when the process is complete. If enough of this material can be melted to form a blob on the end of a blow pipe with the aid of a hot torch, the students may also have the satisfaction of forming an object from glass of their own manufacture.

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Leatherwork—Artcraft or Industrial Arts?

Wayne A. Wonacott

So you have considered introducing leatherwork in your elementary school industrial arts program. I agree that the tanning of hides and the fabrication of leather products represent one of the basic industries throughout the world, but traditionally hasn't leatherwork been found in arts and crafts classes and in recreation and camping programs? It is true, too, that leather products are riding a crest of popularity and the demand for hides has never been greater, but won't this style pass on to other materials?

Up to the present time, no synthetic material has been formulated that matches all of the characteristics of "genuine leather," but with research and industrial technology, isn't this just a matter of time?

Yes, I've seen boys and girls working and discovering personal abilities and interests in manipulative activities, but is there time in the daily program for more?

I suppose most educators agree that elementary school industrial arts has its own unique subject matter, and in addition it is supportive of other subject areas in the curriculum, but where does leatherwork relate? History? Geography? Science? Math? Language? Art?

Really, children should learn to work together, share experiences, solve problems, evaluate achievement, but aren't we doing pretty well now? I am sure it would be worthwhile for students to learn how to cure hides, to understand the chemical technology of the tanning process, and to have some experiences in the manufacturing of leather products, but is this practical in the classroom?

Career awareness is fast becoming an underlying emphasis in the K-6 curriculum. Children are encouraged to consider the vast horizon of career opportunities, but what segment of these careers is the responsibility of the industrial arts program? Can a simple leather activity relate to career opportunities in such fields as product design, market research, merchandising, distribution, sales and servicing?

Your questions are simple and to the point, and you may have others. However, the more questions you ask, the more you will be able to answer for yourself. Leatherwork—artcraft or industrial arts?

"HOW TO START LEATHERWORK IN THE ELEMENTARY SCHOOL CLASSROOM"

This film has been made up of footage taken in four elementary school classrooms from the fourth to the sixth grade. The film shows the use of basic tools, the organization of the work period, the work of children on basic projects, correlations with other subjects, a cooperative or factory project, and suggestions for advanced work. The basic lessons are the result of work with over 60 elementary classes.

The film is being submitted to the Publications Committee of the American Industrial Arts Association for possible inclusion in the Media Library.

Other films in the elementary school industrial arts series now available from the Media Library are:

"How to Convert the Elementary School Classroom into an Industrial Arts Laboratory"
"How to Start Construction in an Elementary School Classroom"
"How to Construct Miniature Scenery"

16mm, Color, Sound All approximately 14 minutes

Write to American Industrial Arts Association
Media Library
1201 Sixteenth Street, Northwest
Washington, D.C. 20036

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Relating Cast Metals to Industrial Education

Clay E. Quaife

Industrial and vocational educators have been stating and implementing various educational programs for many years. These programs, for the most part, basically concern themselves with teaching students about modern industry. If we as educators all agree to interpret industry to industrial arts or other technical students, how can we accomplish these important basic goals and leave out one of our most basic industrial processes . . . metalcasting?

First of all, let's have a brief historical review of the foundry, or a more modern term, metalcasting industry. The oldest known casting in existence was found in Mesopotamia, now known as Iran, which dates back to 3200 B.C.

Since that time, man's conquest of the elements can be directly attributed to advancement in metalcasting technology. First items cast were probably weapons, agricultural implements, tools, cooking utensils, and ornaments or jewelry.

Foundries in the Dark Ages began producing church bells, cannons, cannon balls, and pipe. Some cast iron water pipe made in France as early as 1664 is still in use today. This pipe carries the initials "LF" for Louis XIV, King of France from 1643 to 1715.

The first known castings produced in this country were cast iron pots made at the Saugus Iron Works, Saugus, Massachusetts, in 1642.

The advent of the Industrial Revolution saw foundries provide castings for looms, steam engines, pumps, and a multitude of other things needed by mankind.

Today, as we lead our daily lives, let's get closer to home and see how metal castings affect each and every one of us.

From the moment you wake up until the time you go to bed, you are directly or indirectly using metal castings. Even when asleep, metal castings are serving you. The average American home today has 2-1/2 tons of metal castings scattered throughout just about every room, basement, and attic of the house.

If it were not for metal castings, we would not have the gasoline, diesel, jet, or rocket engines of today or the power plants of the future such as the Wankel and Stirling engines.

Metal castings are used in the transportation industry in trains, cars, buses, trucks, airplanes, and ships.

Castings can even be found on the moon, as the "Lem" and other equipment left there by the astronauts contain metal castings. In future space flights, Space Age metalcasting experiments will be conducted in SKYLAB, scheduled for launching in May 1973. From 3200 B.C. to the Space Age, metal castings have played an important role in the history of man.

Today, without metal castings, we would not be able to enjoy the living standards we have come to expect and take for granted. Actually, castings are involved – either directly or indirectly – with every man-made object we use today. These castings can range in size from a fraction of an inch to many feet and can weigh from less than an ounce to hundreds of tons. Therefore, the foundry is a basic industry.

Present product and production demands, along with new technical developments in all areas of machines, materials, and processes, have made the cast metals industry a modern giant, ranking sixth based on value added among all the industries in the United States.

Since World War II, foundries have been experiencing a technological explosion. Management has been forced to modernize and mechanize to offset an ever-increasing shortage of qualified personnel. Therefore, modern casting operations are using highly sophisticated equipment and production processes. Mechanized molding, including completely automated molding and pouring, has become the bread and butter in the industry. Several high-production plants have completely computerized their melting, scheduling, furnace charging, and metallurgy controls. This is especially true of automotive castings. Castings production today is much higher than ten years ago, and this is being accomplished with fewer foundries.

Since about 1949, both production and "jobbing" shops have taken advantage of a host of new developments. New techniques and processes include, for example, shell molding and coremaking, ductile iron, new gray iron alloys, CO_2 molding and cores, several "air-setting" and "no-bake" chemical types of core binders, "full-mold" polystyrene pattern process, waterless molding sand, ceramic casting, improved "lost wax" and precision casting of aerospace parts, flaskless blow-squeeze molding, "vacuum" melting, magnetic molding, and the new Japanese V-Mold Process.

The major advances pointed out above are not all-inclusive. However, they do indicate the changes that have revolutionized the foundry industry in the last 25 years. These changes have assisted the modern progressive foundry of today in utilizing these methods for greater production, casting dimensional accuracy, casting quality, casting application through improved casting design and product development, and of course, improved profits.

The theme of this conference places emphasis on the Environment and the Urban Society. The foundry industry has long been considered a potential source of environmental control problems. This is true since metalcasting processes, in most cases, can cause environmental control problems, both inside and out of the foundry. Fully realizing the effect the metalcasting process can have on the total environment, the American Foundrymen's Society is no "Johnny-come-lately" in this area popularly called "Ecology." Long before the terms "Environment," "Air Pollution," "Solid Wastes," etc., became popular, the AFS was actively studying and recommending ways and means to help alleviate these problems in the foundry industry and thus make the foundry a good neighbor.

The American Foundrymen's Association (later to be renamed "Society") formed a Safety & Hygiene Section within the Association in 1935. Several key contributions were made by the Safety, Hygiene, & Air Pollution Control staff over the years and in 1969, the department's activities were expanded to include specific environmental engineering services to corporate members of the society.

A new challenge confronted all industries, particularly the foundry industry, with the passing of probably the most momentous and far-reaching law to be passed by the U.S. Government – the William Steiger Occupational Safety and Health Act of 1970. As you read earlier, the foundrymen and the AFS were way ahead of their times when back in the 1930's they began to take a look at the conditions under which their workers were producing metal castings. However, the effect of the new law was far-reaching, in that it made the general public more aware of the working conditions inside the various industrial plants, as well as outside. With the passing of the "OSHA" law, the AFS changed the name of its SH&AP section to "Environmental Control Department," to be all-encompassing of the ecology movement.

The OSHA law had a profound effect, particularly on the cast iron foundries, which had become the target of complaints, especially those which use a cupola in which to melt iron. These foundries were faced with a major decision — either place expensive air pollution control equipment on the cupola or switch to electric melting furnaces.

Let's look at the sources of foundry pollutants which, for convenience, may be classified as follows:

1. Effluents from dust-producing operations within the foundry.
2. Effluents from furnace operations.
3. Odors and gaseous compounds.

The problems arising from each type of contaminant listed above and the methods of control of pollution from these types of contaminants vary with the nature of the specific problem. For example, most of the fine metallic materials from melting operations are less than 0.5 micron in size, requiring very efficient equipment for satisfactory collection. A micron is .001 mm (one-thousandth of a millimeter) or 1/25,000 inch, which is very minute.

The equipment necessary to collect these materials satisfactorily has to be very efficient and thus becomes very expensive. After these materials are collected, a new problem, and often a serious problem, arises. How do you dispose of the collected materials?

The selection of equipment to collect the given dust in the foundry will depend a great deal on the particle size, shape, density, and concentration range of the material to be collected. Then, too, the collection efficiency required by local ordinances, atmospheric conditions, or plant location also have to be considered.

The second type of pollutants discharged by foundries are those from furnace operation. By necessity, the metalcasting process requires that molten metal be used. This requires the use of furnaces in which high temperatures must be reached in order to melt the metal. In most instances, the metal charged into the furnaces is recycled (scrap) metal which is oily, dirty, and covered with oxides. Thus fumes and particulate matter are generated. There are three basic types of equipment used to collect and clean effluent from melting furnaces. These are bag house precipitators, scrubbers, and mechanical collectors.

The early emphasis in pollution or environmental control was that of controlling pollutants which could be seen by the naked eye. Now, however, emphasis is also being placed on odors and gaseous compounds being emitted by industry.

What are foundrymen doing about the problems of odors and gaseous compounds? The foundrymen and their suppliers are actively engaged in research to find ways and means of making the metalcasting process as odor-free as possible.

The economics of air pollution and environmental control equipment for the most part can be considered as a non-productive expense. In other words, the material collected from dust and fume-producing operations is worthless and often requires additional expenditure for disposal.

Foundrymen are not shirking their duty to help make a better environment for all of us to live in. For many years the metalcasting industry was the largest consumer of air pollution control equipment in the United States. Many, many millions of dollars have been spent by the foundry industry to help improve our environment, and many more are still to be spent. The foundry industry is dedicated to helping make our environment a good one in which to live, work and play.

We hope that the material stated above will be evaluated by you as teachers instructing and guiding our young people today of the important role metalcastings play in our day-to-day existence and what drastic steps the foundry industry is taking to curb all types of pollution that have existed, particularly in the making of metalcastings.

The American Foundrymen's Society — Training & Research Institute, Golf & Wolf Roads, Des Plaines, IL 60016, stands ready to assist teachers who have cast metals in their labs or are considering adding this important subject. Assistance can be obtained directly from the above address or through any of the 50 local Chapters located throughout the U.S., Canada and Mexico.

Technical assistance may include:

Metalcasting career guidance booklets and free loan of color/sound filmstrip package.
Publications list, including textbook recommendations; i.e., Metalcasting Instructors Guide.
Consultation with teachers and administrators regarding layout plans, equipment, and safety aspects.

Technical talks and assistance for industrial education conferences, seminars, and workshops by AFS-Training & Research Institute staff personnel.

Metalcasting instructors seminars, held every year in June. This is a 4-day technical program for qualified instructors and supervisors involved with cast metals programs in secondary schools, technical institutes and teacher training institutions. Next seminar will be held at Colorado State University, Fort Collins, June 12-15, 1973. Two hours graduate credit will be offered through the University. Write or call AFS-T&RI for a colorful brochure and registration form.

Assistance with free-loan AFS and other supplier films. Contact AFS Film Librarian for free film catalog.

AFS members in local Chapters provide unlimited help and give the teacher a chance to communicate better with local foundrymen.

The main objective of this paper has been to provide an over-all introduction and updating of the metalcasting industry today, and what it has done and plans to do in the future about the problem of ecology that confronts us all.

We are hopeful that this article will help teachers and administrators recognize the importance of having the metalcasting industry – a basic industry – in their programs.

Mr. Clay E. Quaife is Associate Director/Education of American Foundrymen's Society Training & Research Institute, Golf and Wolf Roads, Des Plaines, Illinois 60016.

Plastics Technology in the Urban Society: An Understanding and Awareness for All

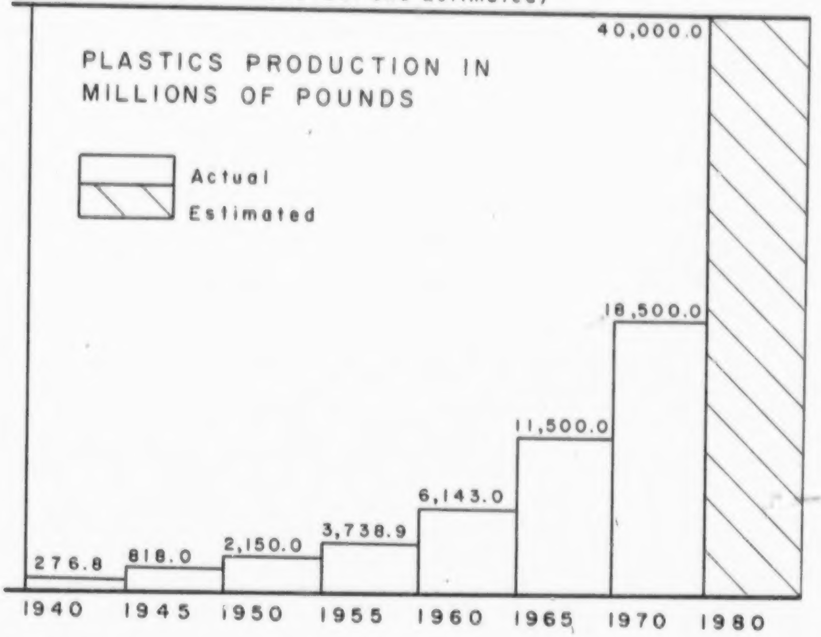
George Alfred Olsen

One can not and should not speak to the topic of plastics technology only as it may be related to the urban sector of our society. One must consider all aspects of our society within this democratic and highly technical culture – urban, rural, suburban, and inner-city – when developing dialogue concerning the complex industrial area we know as the plastics industry and its related technologies. For far too many years, we in this field, as industrial educators, industrial arts teachers, industrial arts teacher educators, and proponents of technology, have tended to avoid this field as an area of study. In support of the previous statement, the following is offered. In 1965, James Runnalls [1] found that about 66% of those students preparing to become industrial arts teachers were receiving some instruction in plastics. Six years later in 1971, a somewhat similar study[2] found that 75.8% of the students then preparing to become industrial arts teachers were receiving some instruction in plastics. This is an increase of 9.8%, or a growth of approximately 1.5% a year. Transposed into numbers, this means an average of three schools of professional education a year added plastics instruction to their program. While this is an indication of growth within the profession, it is comparatively small when viewed in relation to the over-all growth pattern of the plastics industry. We have taught our students how to manipulate woods and metals, ceramics and textiles, and a whole host of other materials, how to identify and classify the basic materials, how to design, build, and/or construct with these materials, and how to maintain and/or service products obtained from these materials. We have permitted ourselves to become stagnated, complacent, or at least short-sighted in our outlook in regard to the newer technologies.

Granted wood, metal, and drawing, as well as some of the other traditional areas, have been with us from the beginning or almost the beginning of our discipline as an area of education. Why stagnate? Why be complacent? Why take the short view? Why wait? Why procrastinate concerning the industrial area of plastics? The time is now! The time to teach our students about plastics is now. The time to consider this industrial giant is now, and an industrial giant it really is. If we accept production as one indicator of the size and scope of an industry, then the following graph[3,4] is most explicit.

This industrial and highly technical area has much to offer, if we but look at it without

PLASTICS PRODUCTION IN THE UNITED STATES
1940 - 1980
(Actual and Estimated)

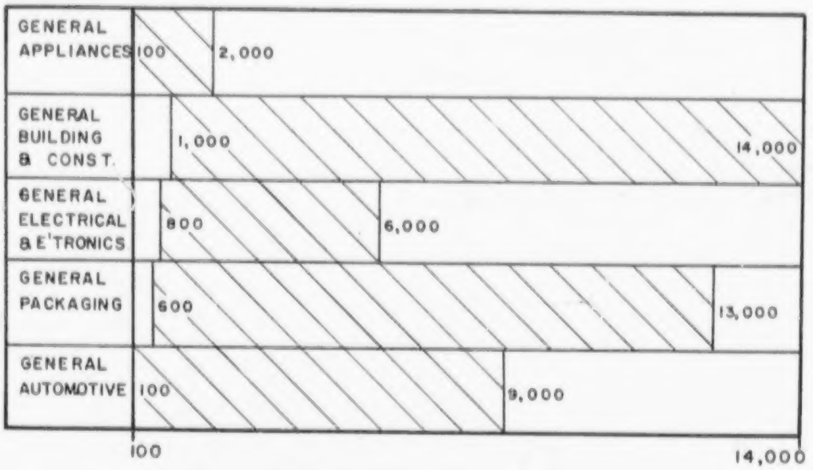


prejudice or preconceived ideas. The over-all industrial potential of this area with all its related technologies is tremendous. The following graph[5] indicates this potential through the estimated consumption of plastics by selected industries in the United States.

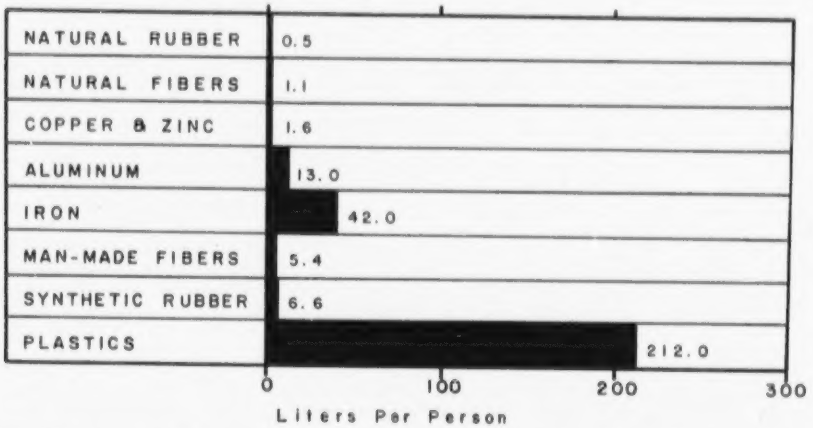
We as a society at present consume a tremendous amount of polymeric material in our everyday living. Those we are now educating in the public schools of this nation and those we are now preparing to teach within this educational discipline will consume even more. At their world conference in Mexico City in 1965, the chemical engineers predicted the following projected individual consumption of specific materials by the year 2000. (See graph next page.)

The year 2000 is not too far in the future; it is just a little more than two and a half decades away, exactly 27 years. For some of us to hope to see the dawn of a new century may be asking too much, but many, many of those we are now teaching or preparing to become teachers will see that time. If the industry continues to grow and expand at its current rate, and there is little at present which indicates it will not, can you imagine the host of basic materials and the myriads of products our students will be confronted with? Look around you right now; what are you wearing, what are you using, what are you sitting on, what are you walking in or driving in? Almost every product we come in contact with every waking day of our lives either has plastics in it as a basic material, was shipped or crated in plastics, or used plastics in some stage of its production or development. Plastics can be found today in adhesives, fabrics, paints, oils, structural materials, films, greases, insulation, and rubber-type products. Plastics as basic molding compounds and general fabricating materials can be found in practically everything: piano and organ keyboards, the heels of women's shoes and the nose cones of rockets, garments and the buttons on garments, parts of an automobile from grille to tail light and from roof to wheels with dozens of parts in between, kitchen utensils and house paint, pipes and plumbing fixtures, medical equipment and prosthetic devices, safety items and construction

ESTIMATED CONSUMPTION OF PLASTICS IN MILLIONS OF POUNDS BY SELECTED INDUSTRIES IN THE U. S. FROM 1960 TO 1980



PROJECTED INDIVIDUAL CONSUMPTION OF MATERIALS - 2000 AD



materials, toys and weapons of war. Let us be honest with ourselves; a plastics world surrounds us, and we are now living in a plastics age. Many of those things we now accept and take for granted just might not be here if we did not have plastics. It does not matter what area of society we are concerned with; urban, suburban, rural, or inner-city, plastics products are here to stay. They are the same products, regardless of the area within our society, although they are present in some instances to a greater degree than in others.[6]

We, as educators, must be prepared to present to our students the information, skills, and knowledge necessary to live in our current technical society, as well as prepare them for the future. As Raymond VanTassel, formerly of New York University, stated, "Too many of us are teaching those things which pertain to the era of the horseless carriage rather than to the era of jet propulsion and space travel."[7] We, you and I, must begin, if we have not already done so, to expose our students to plastics and its related technologies. We must expose them to and instruct them in regard to the basic materials, their composition, physical characteristics, engineering capabilities, production problems, consumer concerns, and ecological problems. We must introduce them to the varied means of production, with ample opportunity for hands-on application of the skills and techniques related to plastics and create within them, as well, an appreciation for material selection and application and good design. We must introduce them to the industrial equipment necessary to manufacture products from polymeric materials.

When one considers these areas, one can begin to see we are not talking about plastics alone, but a variety of associated subject matter topics, using plastics as the vehicle or matrix. We are talking about such subject matter as chemistry, rheology, hydraulics, pneumatics, mechanics, metallurgy, product design, production techniques, controls and controlling methods, consumer demands and consumer education, ecology, and even the time-honored machining of metal and the manipulation of wood. We are also concerned with this area's relationship to packaging and all its implications within our society.

Let us look a short while longer at this industrial giant before we try to relate what has been said to our society. At present the Society of the Plastics Industry has within it almost 3000 member firms[8] and it is estimated there are many more than that number actually producing material and manufacturing consumable goods within this country. Estimates in this regard range as high as 10,000 processing plants.[9] The Society of the Plastics Industry and the Society of Plastics Engineers, through their Joint Education Committee, conducted in October 1967 a nationwide survey[10] of processing plants. Over 4000 firms were contacted, with an approximate response of 25%. This survey indicated a serious shortage of trained personnel within the industry on a nationwide basis and that the shortage was and would be in a direct relation to the size of the industry in any given geographical location, regardless of the size of the firms. The study also indicated the shortages to be most critical in the areas of skilled employees and mechanical engineering personnel. An important educational implication of the survey was that the area of need for broad as well as specialized training programs was at both the high school level and the college level. The survey further indicated that more than 70% of those who responded would pay employees more for pre-employment training in the field.[11]

Plastics technology and its relationship to our society and in particular the urban society would not be too difficult to establish and defend, if all in education were even partly convinced there was a need for this type of instruction for our students. We all know, though, that even within our own field there is opposition to the development of plastics programs for various and sundry reasons. The data initially here presented concerning the growth of this area within our teacher education institutions bears this out. We also know full well that this is a vibrant and growing industry. The first and second graphs here presented point this out most explicitly. As for consumption of this material and its products by society, the third graph readily visualizes for us the need for consumer education on the part of society in general, with specific emphasis in some areas, one of which most probably will be urban society.

What then can we, as educators, possibly do to resolve the problems we are confronted with?

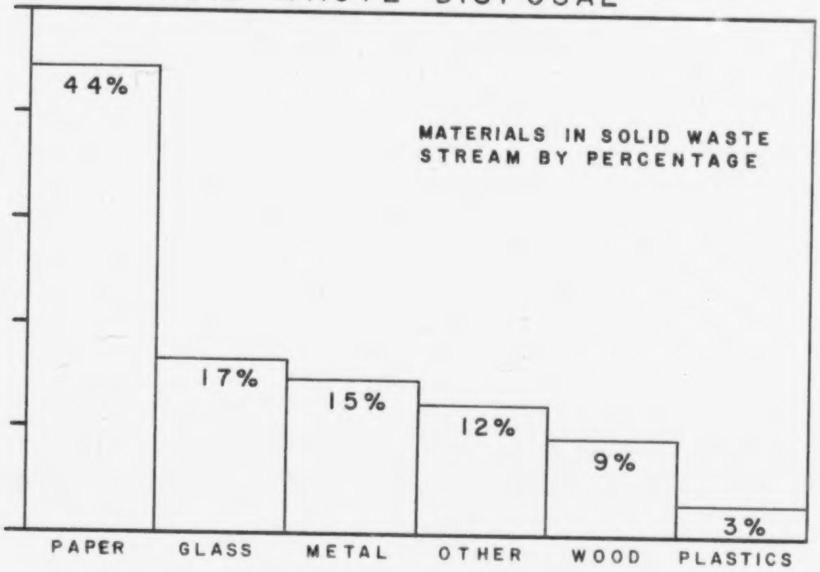
> First: We must establish beyond any doubt that there is a need to have the students in our charge know about and understand this complex industrial area. Then:
>
> Second: We must develop programs of instruction at and for all levels of education to meet the need or needs we have established. Then:
>
> Third: We must continually re-evaluate and upgrade our offerings to meet any and all changes in the needs we established or modifications within the industry itself.

This cannot and should not be done in a vacuum. We need and must obtain the involvement of industry, as well as all of our educational forces, if what we will do is to be meaningful.

The three areas of educational concern are basically skills and process understanding, consumer education, and environmental considerations. The first of these is easily established and has been accomplished to some degree by some individuals and institutions. In the last several years there have been a number of doctoral dissertations and other research studies which have begun to set the stage and initiated to some degree a new frontier within our field.

A need for consumerism and environmental consideration are prime reasons for the plastics industry and industrial education to develop and implement social as well as technical education strategy in the very near future. With the consumer movement becoming more militant and effective and with legislative, administrative, and private sectors joining forces to right the wrong within the market place, the industry and education must join forces and focus more directly on product dependability, fire and safety hazards, advertising, food and product packaging standards, recycling, litter, pollution, and incineration problems.[12] The answer in part to this problem is basically one of our cardinal principles, that of consumer education. In general, our high standard of living causes us to use billions of pounds of plastics each year, as well as the same quantity in other materials. Solid waste (3.5 billion ton/yr),[13] a grave problem within our society, especially within the urban and inner-city sectors, must be dealt with more effectively. Here again, consumer education plays a most decisive role. As we achieve higher standards of living, it simply means there will be higher consumption rates of plastics. At present, plastics account for only 2-5% of the current solid waste problem.[14] The following graph shows this percentage in relation to other materials in the solid waste stream of our nation.

SOLID WASTE DISPOSAL



It is presented here simply to indicate graphically one of the many different types of problems we as a society are faced with and which should concern us as educators. The environmental issues faced by the plastics industry and industrial arts education, if we become involved, are most complex and trying, not only because of major social considerations such as ecology, consumer protection, and even the basic industry itself, but all of this set in a matrix established by the remainder of our national economy.

The industry, as well as society in general, has grown and changed in the last two and a half decades. Those who can remember can readily see the impact it has had upon our society to date. The question that remains is: "What will happen to the plastics industry in the next two and a half decades, and what are we in industrial arts and industrial education going to do about it?" The industry itself sees tremendous growth in a variety of areas, all of which affect our society, whether it be urban, suburban, rural, or inner-city. We, as individuals concerned with technological subjects and their impact upon our environment, should be prepared to meet this and any other ever-changing and complex challenge.

FOOTNOTES

(1) James Runnalls, "Plastics Technology and Its Reflection in Industrial Arts Teacher Preparation", (unpublished Doctoral dissertation, University of Missouri, Columbia, 1965).

(2) George Olsen, "Plastics Technology and Its Implementation in Industrial Arts Teacher Education", (unpublished Doctoral dissertation, New York University, New York, 1971).

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(4) Plastics World, Plastics and Ecology: Seminar Proceedings, New York, 1971.

(5) Society of the Plastics Industry and the Society of Plastics Engineers Joint Education Committee, The Need for Plastics Education, New York, 1969.

(6) Harry DuBois and Fredrick John, Plastics, (New York, Reinhold Publishing Company, 1967).

(7) Raymond VanTassel, "Summary", Research in Industrial Arts Education, Ninth Yearbook, American Council on Industrial Arts Teacher Education, (Bloomington: McKnight and McKnight Publishing Company, 1960).

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(9) Lee R. Noe, "Market Managers' News Letter", November 3, 1966, Editors Plastics Technology Magazine.

(10) Society of the Plastics Industry and the Society of Plastics Engineers, op. cit., note 5.

(11) Ibid.

(12) Plastics World, op. cit., note 4.

(13) Ibid.

(14) Society of the Plastics Industry, Environmental Pamphlet, 1971.

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Simulated Wood Furniture Through Plastics Technology

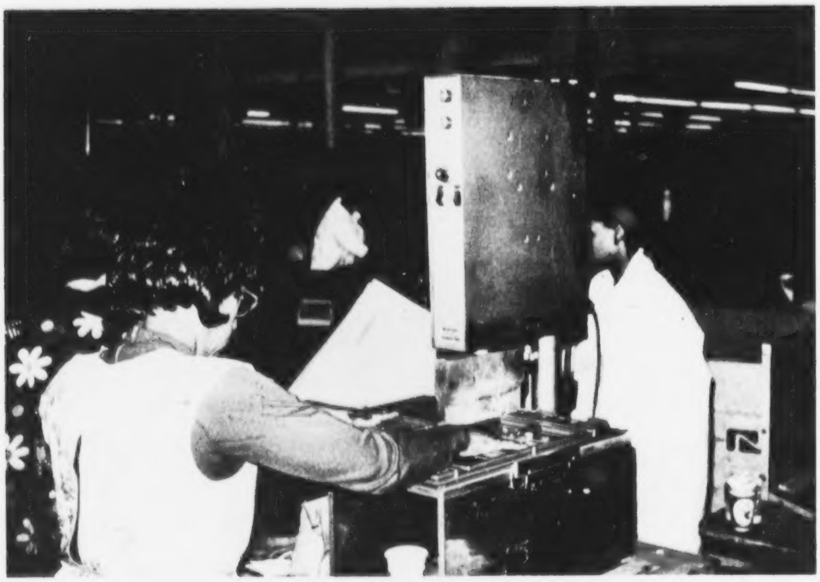
Franzie Loepp

Gary Weede

A complete tour of a comprehensive furniture store reveals that plastic can be found in many forms. Plastic in furniture can be rigid, contour fitting, in sheet form, inflatable, quite modern or in period styles, contain foam and fabrics of all types, descriptions, and colors. Many plastic materials are used in furniture, and it is easy to get confused. To clarify the situation, let's look at several types of plastics frequently used in furniture.

TYPES OF PLASTICS

Over one third of the total number of metric tons of plastic used in furniture (453,000 metric tons in 1972)[1] is polyurethane foam. Its greatest use is in cushions. In addition, it is widely becoming accepted in the rigid form for simulated wood parts. Some of the most realistic wood simulation through relatively simple techniques are accomplished with this material. Nearly another third of the total consists of polyvinyl chloride, which has long been recognized for quality in fabrics under trade names such as Naugahyde.



Ultrasonic welding furniture components

A new twist is to use thin, embossed vinyl, which is vacuum formed and filled with urethane foam and backed by particle board. Ranking third in descending order is polystyrene; nearly all is injection molded and of high impact grade. Most simulated wood components are produced of this material. Next is Phenolic, the oldest thermal-set plastic, yet millions of pounds are used each year to saturate Kraft paper to produce the substructure of high-pressure laminates such as Formica and Micarta.

Fifth on the list are the polyolefins such as polyethylene, polypropylene and ethelene vinyl acetate. While ethylene is best known in the film form, other olefins are used for outdoor furniture and stackable chairs. Sixth are the polyesters. They appear in furniture under such names as Milar, Dacron, and Fiberglass. Their durability and the low initial cost of production contribute to a rise in the use of these materials. The seventh polymer – melamine – is known and accepted as dishware; however, a greater amount of this polymer is used as the surface material in plastic laminates. The last major polymer used in furniture, acrylonitrile butadine styrene, is a high-impact material also used in luggage and automobile bumpers. In furniture, it is found in decorative casting, chrome-plated parts, and structural shelves or upholstered furniture.

There are a number of other polymers used in furniture – e.g., acetal, acrylic, butyrate, epoxy, nylon, polycarbonate, etc. – but the total consumption of these as compared to the eight polymers mentioned above is comparatively small.

PLASTICS ENTER FURNITURE INDUSTRY

Shortly after plastics were first discovered, they were tried in many different applications, including decorative and substitution parts. Subsequently, plastics came into widespread use in unnoticed parts such as casters, chair glides, tubing caps, etc. However, in the past few years a wave of plastic has moved into the furniture industry. It appears the wave is just starting to grow as company after company incorporates plastics into their furniture line.

There are several reasons for this continued growth. First, the decreasing supply of skilled craftsmen and rising cost of labor caused all but the simplest constructed furniture to be priced higher than the average buyer normally wants to pay. A second

Injection molding structural foam members

advantage is that plastic does not crack or warp with temperature and humidity changes; therefore, close-fitting drawers and doors will not bind and stick. Thirdly, plastic can be formulated to meet any desired color, all uniformly through the part. Thus, scratches and mars go unnoticed. Fourth, plastic can be molded into single units, thereby eliminating the time required to produce a number of wood parts and joints. The finished product then contains fewer assemblies which are likely to come loose as a result of hard use from adults and children alike. This contributes to lower labor cost and fewer customer complaints.

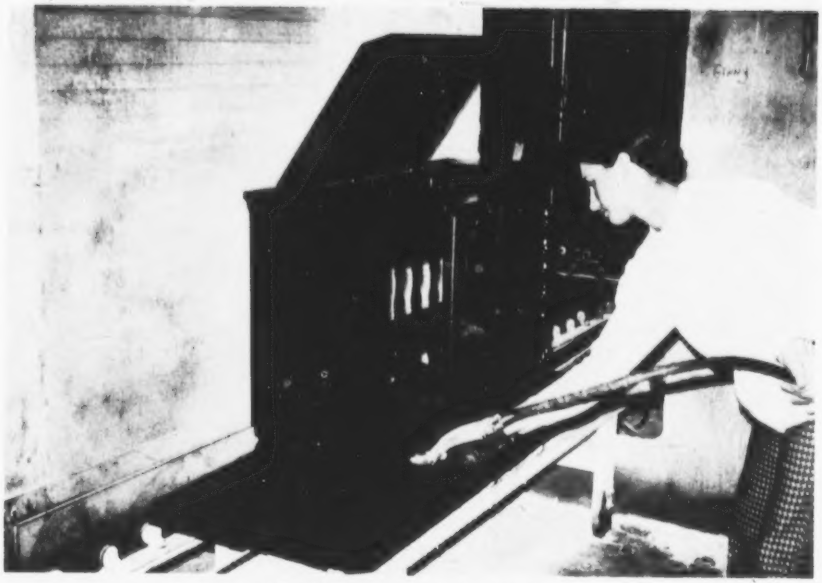
Fifth, since wood is an anisotropic material which exhibits different properties perpendicular and parallel to the grain, some problems in construction are encountered which are not of concern when using plastic material. The apparent grain direction of wood-simulated parts does not dictate the strength properties of the structure. And finally, the quality of wood gets closer and closer to the minimum for a special grade while its cost continues to rise. On the other hand, the quality of plastic materials is continually improving, and as the volume of the improved varieties of plastics increases, the price decreases. In addition to all these advantages over wood, plastic furniture does not have to look like wood. Furniture designers have a considerable amount of freedom to choose from a wide range of polymers as they select colors and shapes for their products.

In 1965, the amount of plastics used in furniture was about 155,000 metric tons. By 1972, the amount had increased to almost 453,000 metric tons. The future looks even better, with conservative predictions of over 1,200,000 metric tons worth $18 billion in retail sales by 1980.[2,3]

CONSTRUCTION OF FURNITURE FROM PLASTICS

If over 5,000 parts per year are required, the plastics process which would be selected would be injection molding. Styrene parts are most commonly injection molded. Equipment costs are higher for this process; however, it is the fastest way of producing parts.

Injection molded parts are moved from the molding area to the assembly line where they are joined with other injection molded parts to form larger sections which would be



Finishing a styrene stereo cabinet

too costly or impractical to mold in one piece. Special clamps hold sub-assemblies in position while workers use the ultrasonic welders to assemble the furniture. Little time is required for plastic weld to cool, which results in rapid assembly. In addition to the common injection molded styrene part, structural foam styrene parts are also being used. The advantage of high strength is combined with light weight which closely matches that of wood components.

Urethane foam components can be produced either by combining the urethane foam with other materials such as corrugated paper, form box structures, or speaker enclosures, or it can be foamed into a mold to form a part which closely resembles its wood counterpart. Because of urethane's varying density which can be formulated, it can produce heavy or light articles as desired. For industrial applications, urethane foam is normally mixed and dispensed by precision equipment into open molds which are then closed while the foam expands to fill the mold.

A variation of this process is to vacuum form a flexible vinyl and then dispense the urethane foam into the vinyl while it is still in the mold and add particle board fillers to reduce the amount of foam required. When a wood grained vinyl is used, the part looks very much like wood.

FINISHING PLASTICS

If the simulated wood furniture does not have a printed finish, the finishing process would be similar to that which is used for wood furniture. The first step is to apply a stain or filler. When they have dried, distress marks such as worm holes are added with a crayon. Then fly specs are sprayed on, if desired. The product is usually finished with a top coat of lacquer. Inspection and "touch-up" follow as the final steps in the finishing process.

PRODUCTION IN THE SCHOOL LABORATORY

Simulated wood furniture components can also be made in the industrial education laboratory. To emphasize wood grain, choose an open grain species such as ash or oak.

Most patterns have intricate designs with no great undercuts. Once the pattern is complete, preparation for molding begins.

The first step is to build a mold frame. The pattern is then installed in the mold frame. A mold release is applied to the pattern and the mold frame followed by a silicone casting material which is poured over the pattern. When the silicone has cured, the mold frame is removed and the silicone mold is peeled off the pattern. The quality of the silicone mold will depend on the care taken during the pour.

Deaeration of the silicone before it is cured helps to eliminate bubbles in the finished mold. Although some silicone materials are highly tear-resistant, the use of fiberglass to reinforce thin sections will extend the mold's life. Again, it is important not to introduce air into the mixture when adding the glass.

If the mold is intended for urethane foam, it is necessary to have a box to hold the mold. A box similar to that used to make the mold will suffice. It is also necessary to be able to clamp a lid quickly on the mold. The entire assembly must be able to withstand a considerable amount of pressure.

MOLD RELEASE

Using urethane foam, a mold release of 5% vaseline and 95% metholene chloride should be applied to the mold. An alternate to the mold release is to apply a commercial barrier coat to the mold. As the foam mix is introduced and cured, this coating becomes an integral part of the foam skin, thus forming the ground coat for the finishing process.

FOAMING WITH URETHANE

Most urethane systems are supplied in components. Component A generally has the isocynate, which provides a balance of good flow properties and skin stiffness. Component B has the blowing agent, catalyst, and surfactant. For hand pouring, the formulation is usually designed to be used in equal amounts measured by weight. The amount of foam for a given mold cavity depends upon the desired density of the finished part. To increase density, simply add more urethane foam.

When the components are mixed, they are quickly poured into the mold cavity. The lid is securely clamped on the mold. Usually about ten minutes is allowed for the cure.

WEP

An alternate to rigid urethane foam is water-extended polyester, referred to as WEP. This specialized polyester resin is mixed with up to 50% water to provide a uniform, highly stable emulsion. The water must be added slowly to the resin by letting it flow down the shaft of the electric mixer. After the water is added, the catalyst is introduced. Deaeration is not necessary in this process. The mold cavity is completely filled, and no top is required. This part will cure in 1 to 24 hours, depending on the amount of catalyst added and the ambient temperature. The demolding procedure for WEP is the same as that for urethane.

FINISHING

When finishing urethane foam components, if a barrier coat has been applied to the mold before adding urethane foam, the finishing system which is recommended by the manufacturer of the barrier coat should be used. Staining usually follows the application of a barrier coat. Fillers or glazes are used to impart a wood-like appearance to plastics. Stains may be blended into the glaze or filler to match any wood portions of the final product. An antique effect can be obtained by spattering fine dots of a dark finish on the product. Distress lines may be added with a special crayon.

The final steps are usually done with a spray gun. Semi-gloss lacquer seems to be the most popular coating. Treaded fasteners and adhesives are most commonly used to combine plastic components to wood assemblies. Generally this operation is performed before the finishing process begins. The final result is a piece of furniture made of plastics which is very difficult to distinguish from its wood counterpart.

FOOTNOTES

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(2) Waechter, Charles S., "An International Survey of Plastics in Furniture," National Technical Conference, St. Louis, Missouri, November 10-12, 1970.
(3) "Plastics Technology," 16, No. 9, New York: Bill Brothers Publishing Corp., September 1970.

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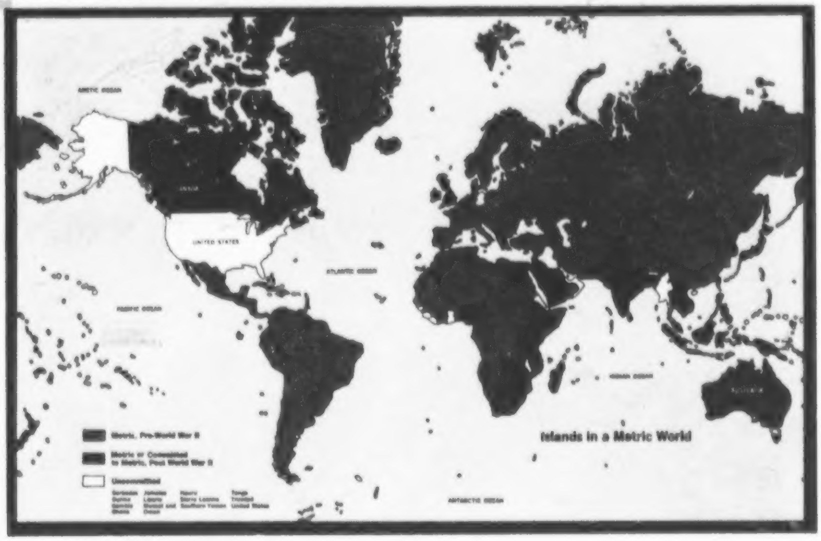
METRIC SYSTEM

The Metric System and Technology

Jeffrey Odom

Way back in 1821, John Quincy Adams, in a report to the Congress, stated that "weights and measures may be ranked among the necessaries of life to every individual of human society. They enter into the economical arrangements and daily concerns of every family." (He said a bit more, but that's unimportant now.)

As you are aware, the "necessary" weights and measures which we commonly use in the United States are based on the yard and the pound, parts of the so-called customary system of weights and measures.


Arctic Ocean
Canada
United States
Atlantic Ocean
Pacific Ocean
Indian Ocean
Australia
Antarctic Ocean
Metric, Pre-World War II
Metric or Committed to Metric, Post World War II
Uncommitted
Barbados
Burma
Gambia
Ghana
Jamaica
Liberia
Muscat and Oman
Nauru
Sierra Leone
Southern Yemen
Tonga
Trinidad
United States

Islands in a Metric World

What about the rest of the world? They are almost exclusively using another system – one called the metric system.

You may have heard something recently about the increasing use of this metric system here in the United States. The primary reason for this is the increasing use of metric in our industry, which finds it feasible and necessary to change to international metric standards for two reasons: first as an aid to maintaining and expanding our exports and, secondly, as a means of avoiding the inefficiency and inconvenience in operations of U.S. plants at home and abroad, manufacturing the same products to different standards.

Concurrently with our industry's expansion of metric usage, the National Bureau of Standards conducted the U.S. Metric Study for a Congress that was concerned about the effects of this increasing world-wide domestic metric usage.

I don't intend to bore you with the details of the study. If I did, I think you would agree that it was a very comprehensive study. It was also very complex, but its findings were fairly straight-forward, and I would like to share the three main ones with you now.

First, the U.S. already makes some use of the metric system, and metric use in the United States is increasing. Examples are easy to find. These trends are so pronounced that it is apparent that we will eventually become a metric country, even without any further government action.

Second finding: a great majority of businessmen, educators, and other informed participants in the study believe that increased metric use is in the best interests of the U.S., and an even larger majority believe it is better for the nation to increase its metric use by plan rather than by no plan.

Third finding: this concerns the costs and benefits of metrication. We made an attempt to determine such figures primarily because what everyone wants to know is, "What will it cost?" Such costs and benefits are extremely difficult, if not impossible, to evaluate in dollars and cents. This is verified by the British experience that such estimates cannot be made, even after conversion, because the metrication costs are hard to identify. The point to be made, however, is that whatever the cost, it will be less if we go metric by plan. Remember that we are already slowly drifting to metric; thus our metric costs, whatever they are, are going to occur. We realistically do not have the alternative of not spending the money, not going metric. Therefore, it is not fair to speak of the cost of metrication and stop there; we must consider that a planned program, although it may cost "x" dollars, will lead to an actual net savings for us in the long run. The reason, of course, is the obvious savings that come with careful planning and coordination.

With these findings in hand, the study's final report was written and transmitted to the Congress with a series of recommendations by the Secretary of Commerce. The major recommendations were:

—that the United States change to the international metric system deliberately and carefully
—that this be done through a national program, coordinated by an official body
—that a target date be set 10 years ahead
—that changeover costs "lie where they fall"
—that early priority be given to educating school children and the public at large
—that immediate steps be taken to strengthen U.S. participation in international standards activities

Just what does this mean? It means we would essentially continue the metric changes we are now making, only with more coordination and with a definite goal in sight. More specifically:

1) In 10 years we would switch the roles of metric and customary units; the U.S. would become predominantly metric, but not exclusively so. Some sectors of the economy would take less time, others more; but all could be accommodated.

2) Rule of reason would guide the change. Most things would be changed only when worn out or obsolete. Some things would be changed early, some slowly, some never for metric reasons alone. Change to what? The great majority of international metric standards have yet to be developed; the U.S. should help develop them so they would reflect our technology and serve our needs.

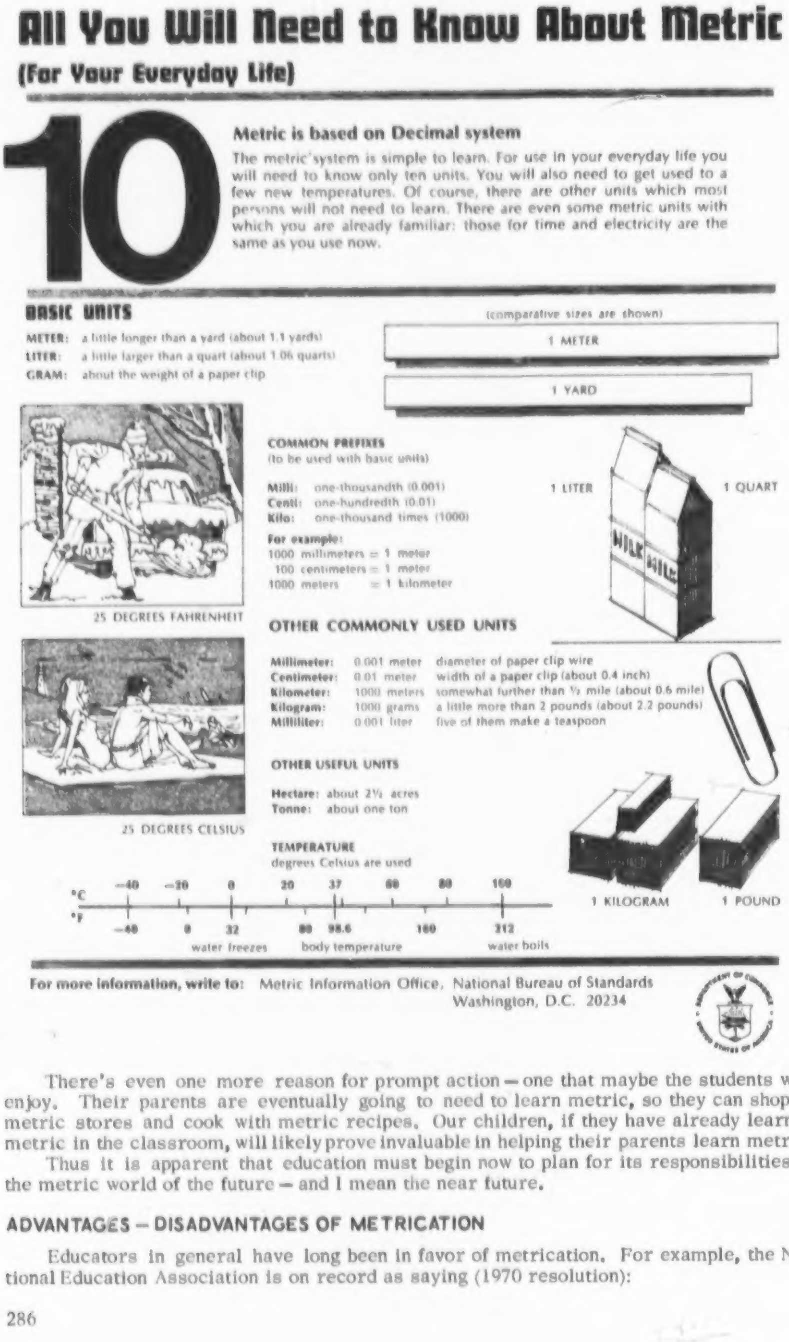
3) A central metric coordinating board should be established to help all sectors work out their own plans and timetables, ensure that all these plans are meshed, work out a program of public education, and anticipate and deal with special problems.

Congress has the report of the U.S. Metric Study and the Secretary's recommendations. They are also aware that industry is increasing its metric usage. The next step is up to them. Legislation was introduced in both the House and Senate last year, and the Senate acted favorably. The House didn't have time, and the issue died. Metric legislation has already been reintroduced this year and the outlook, though hard to predict, is good for favorable action. There is much interest and not much opposition.

EDUCATIONAL IMPACT — GENERAL

Regardless of what does happen officially — and most persons feel it's just a matter of time — what are the metric implications for education? Education is an important part of metric change. It is generally acknowledged — including one of the Secretary's recommendations — that the present situation (rapidly increasing metric usage plus the likelihood of Congressional action in the future) is such that attention must be paid now to the question of improving both the quantity and the quality of metric education. Admittedly, as long as we do not officially "go metric," we can't consider phasing out customary measurement learning, but even until we do go metric, we need to be teaching metric more thoroughly in our schools.

Another reason for early movement in metric education — aside from the present use of metric — is that we need to be sure that every child now in school is adequately equipped for the future. There is really no question but that those students starting school this year will be graduating into a metric world. If they don't adequately learn metric, they certainly will be ill equipped for the world they will inherit.



All You Will Need to Know About Metric

(For Your Everyday Life)

10

Metric is based on Decimal system

The metric system is simple to learn. For use in your everyday life you will need to know only ten units. You will also need to get used to a few new temperatures. Of course, there are other units which most persons will not need to learn. There are even some metric units with which you are already familiar: those for time and electricity are the same as you use now.

BASIC UNITS

METER: a little longer than a yard (about 1.1 yards)
LITER: a little larger than a quart (about 1.06 quarts)
GRAM: about the weight of a paper clip

(comparative sizes are shown)

COMMON PREFIXES
(to be used with basic units)

Milli: one-thousandth (0.001)
Centi: one-hundredth (0.01)
Kilo: one-thousand times (1000)

For example:
1000 millimeters = 1 meter
100 centimeters = 1 meter
1000 meters = 1 kilometer

OTHER COMMONLY USED UNITS

Millimeter:	0.001 meter	diameter of paper clip wire
Centimeter:	0.01 meter	width of a paper clip (about 0.4 inch)
Kilometer:	1000 meters	somewhat further than ½ mile (about 0.6 mile)
Kilogram:	1000 grams	a little more than 2 pounds (about 2.2 pounds)
Milliliter:	0.001 liter	five of them make a teaspoon

OTHER USEFUL UNITS

Hectare: about 2½ acres
Tonne: about one ton

TEMPERATURE
degrees Celsius are used

For more information, write to: Metric Information Office, National Bureau of Standards
Washington, D.C. 20234

There's even one more reason for prompt action — one that maybe the students will enjoy. Their parents are eventually going to need to learn metric, so they can shop in metric stores and cook with metric recipes. Our children, if they have already learned metric in the classroom, will likely prove invaluable in helping their parents learn metric. Thus it is apparent that education must begin now to plan for its responsibilities in the metric world of the future — and I mean the near future.

ADVANTAGES — DISADVANTAGES OF METRICATION

Educators in general have long been in favor of metrication. For example, the National Education Association is on record as saying (1970 resolution):

> **The NEA believes that a carefully-planned effort to convert to the metric system is essential to the future of American industrial and technological development and to the evolution of effective world communication. It supports federal legislation that would facilitate such a conversion.**

The National Council of Teachers of Mathematics stated last year that it continues to support the adoption of the metric system and encourages that this be a system to be taught by teachers of all grades, along with other systems of measurement, beginning in the 1973-74 school year. The Council even devoted its 1948 yearbook to the metric system.

Why is it that education, or at least the key education associations, are so inclined? It's easy to understand when you look at the advantages and disadvantages of metric education as compared to customary measurement education.

The chief educational advantage of using the metric system lies in the simplification of teaching and learning how to measure. This advantage arises from the simple interrelations of units mainly based on multiplication by 10 and from the ease of computing with decimal fractions and whole numbers.

Another advantage would be that the educational system would no longer be burdened with teaching two systems of measurement and would be able to concentrate on the one which is simpler and more easily understood. Time saved due to teaching a simpler system could be used for the introduction of valuable new materials. At the same time, much of the customary drill in fractions could be reduced, although we would of course need to retain an easy familiarity with halves, thirds, quarters, and fifths; but even so, we would be able to gain even more time that would be available for other work.

What's the major advantage of the customary system? That it's familiar to most people — and of course, the metric system is not.

With these facts in mind, it's easy to see why metric is favored by educators in general. (I'm not pretending that all of you are pro-metric.) But there's even another advantage of going metric, perhaps one that outweighs all the others.

I'm speaking about the opportunity during the change for what some educators feel are much-needed curriculum changes. They're referring to things such as early introduction of decimal fractions, with corresponding reinforcement of the place value system; a considerable downplay of inessential skills in manipulation of fractions; and an upgrading of effort in teaching measurement in the schools. Whether or not such reform is needed, I leave to you and other educators to decide. The important point is that metrication would provide an ideal time for such changes, should they be desired.

AREAS OF METRIC IMPACT

It seems to be generally agreed that metrication is coming, and it would indeed be good for education. The question then becomes where will the change impact education, and how can this impact best be handled.

I will briefly consider three broad areas: curricula and associated text books; teacher training; and other educational materials, including library books and lab and shop equipment. Of course, I can't speak as an expert in any of these areas. But let me give you a few words of how a metric expert views these impacts. Perhaps they will help you — the educators — to assess these impacts for yourselves.

Curricula/Textbooks

The important area of curriculum change is probably quite complex, especially in light of any of the proposed changes. What we're talking about is not merely a mechanical conversion from customary to metric units in existing curricula, but substantive changes of some kind. Certainly we have the expertise available to properly revise curricula. I only hope that, once a national metric program is enacted, national organizations will support such new curriculum developments.

Once they are ready, we will need revised texts. The process of getting revised books into the schools should not prove to be a big problem. A key point is that at present most books are only used for about five years.

Textbook editors indicate that in the course of normal reprinting and revision practice, many textbooks could undergo metric conversion in a period of 5 years or less. If a lead time of 2 or 3 years were provided for changes, and if the people who select and buy textbooks were advised that changes were in process, and if they adjusted their replacement and renewal schedules accordingly, then new materials would be available and would reach students promptly after the beginning of a metric conversion period.

The cost? If this method is followed, it would easily be absorbed in the usual replacement cost.

This is the ideal way of making the change, and certainly it won't apply to all cases. The problem, of course, is those schools that do not change books every five years. They will have an added cost, and it is probably they who can least afford it.

Teacher Training

Certainly, some training will be necessary for you to be able to teach metric properly. This need is not just for math and science teachers. In a general conversion to metric, teachers in all classes that use measurement units should be expected to begin using metric units. That's really most teachers: English, geography, shop, home economics, etc. These teachers will need to develop at least a working familiarity with metric units. Certainly, the retraining necessary for these teachers will not approach the amount needed for math and science teachers, who will have to teach — not just use — the system.

For these, most educators agree that 8 to 15 hours of in-service training would suffice to prepare mathematics and science teachers for going metric. Most schools have in-service training programs which could easily accommodate the needed training.

However, there will be a problem for the small percentage of teachers with no such in-service training available. Special efforts will have to be made to ensure that these are reached, especially those who are geographically isolated. There's another possible side benefit here, by the way. Perhaps the need for training for metric conversion may prompt the formation of a regular program. How should the training be done? Dr. Robinson recommends that it should be tightly structured, well organized, and preferably condensed into a short time span, ideally just before new metric materials are used.

Other Educational Materials

This area is quite complex, but let me say just a few words.

First, printed and other "software" (films, maps, etc.): Replacement of library books and encyclopedias would not be an obstacle, in light of usual replacement cycles and given a 5- to 10-year conversion period. Much of the other materials turn over with a typical lifetime of less than a decade, and as such pose no special problems.

But what about "hardware," the lab and shop equipment, including things in office and home economics training? Without a census of all schools, it's impossible to know the magnitude of change needed. But we can say it is considerable and could be costly, though such costs would likely be small compared to total education budgets. The necessary modifications to existing equipment could likely correspond to a year's depreciation, and this cost would not have to be taken all at once, but could be spread over several years.

Differences in cost may arise due to the way the change is viewed. It's interesting to compare two responses in our education study to a question concerning the changes:

(1) One technical school reported: "It is not worthwhile to modify an old machine if modification should cost as much as 10% of the price of a new one; we would have to buy new machinery."

(2) One vocational school said: "We would modify our own machines; it would give the students some meaningful projects to work on."

In all areas, metric conversion will have a great deal of impact, but generally speaking, a well-planned program, given proper time to make the changes, need not be overly expensive or overly hard to do. The key is the proper planning and proper timing.

Incidentally, this is just another reason why a planned metric conversion program is desirable. Too long a conversion period or a long-drawn-out drift toward metric might dilute or sacrifice the sense of purpose and change, and it would of course continue the need to teach two measurement languages and delay any needed or desired curriculum changes.

HOW TO TEACH METRIC

I've said about all I can related to changes needed in education and how they will impact your operations. I'd like to briefly switch gears and give you a few ideas about how (and how not to) teach metric. Please remember that these are from a non-educator who knows a little about the metric system. I think, though, you probably will agree with their validity.

It is best if both students and teachers learn to use metric units by measuring familiar things in metric units only. I would warn against a general attempt to teach metric equivalents and conversion factors from customary to metric and vice versa. Nothing can turn off a person's interest more than requiring the memorization of a series of lengthy conversion factors. An engineer may need to know that 1 cm equals 0.3937 inch, but not the average person.

Let me emphasize the idea of learning by doing. It is of course possible to learn metric units by study only, but the familiarity with metric units that is needed can only come with actually measuring things, plus using the new measurement language in meaningful, everyday expressions.

Finally, it would seem wise to avoid — in most cases — supplementary metric workbooks or pamphlets along with existing texts. The books and curricula should be revised to achieve all of the possible benefits.

CONCLUSION

I hope I have given you at least an idea of what will be happening in education as metrication comes about. I hope it's been enough to get you thinking about what the impact would be on your positions and that perhaps you will begin to prepare yourselves soon for the challenge ahead. It is really important that you, our educators, begin to plan now for metrication.

Let me stress once again: we are going metric in this country; there is no way to avoid it. And it is imperative that education, which is an important part of the process, be ready to aid in the change.

Mr. Odom is Assistant Coordinator of Metric Activities, National Bureau of Standards, Washington, D.C.

POWER

Power Technology in the City School

George Samson, Jr.

Power technology courses have been conspicuously lacking from the industrial arts program of most city schools. Most of those who teach industrial arts in city schools emphasize that course work must contain substantial amounts of manipulation or physical activity. This is one reason why power mechanics courses seem favored over power technology courses. These power mechanics courses deal with small engine repair and maintenance, with a touch of auto mechanics. In reality, very few city school children will ever own lawnmowers or other small internal combustion engine devices.

In short — activity is being provided, but the relevancy of the subject matter is questionable.

PROBLEMS

Cities contain many problems that are acute, with some which are unique. Air pollution, solid waste disposal, water pollution, power and fuel shortages, and transportation are examples familiar to all of us, but not presented to our students in a way that involves them in possible solutions. Each and every city resident must live with these conditions every day of his life. Power courses in the city should concentrate their efforts on these areas and might use small engines to teach and demonstrate operating fundamentals. These fundamentals should be both mechanical and operational, as well as cover all types of engines: gasoline, piston, diesel, wankel, gas turbine, steam engine, and turbine. Students should learn how it works, what fuel it consumes, what pollutants it gives off, and how efficient it is from several points of view.

Most power teachers would point out that teaching how engines work is a considerable task. They would ask, "What series of courses could be used to present all of this information?" The following is a basic guide:

8th - 9th Grade — Power mechanics—how it works, what fuel it consumes, what pollutants it gives off, and how efficient it is.

10th - 11th Grade — Power technology—problem-solving: air pollution, water pollution, electric power generation, mass transit, solid waste disposal, etc.

12th Grade — Specialty courses: auto mechanics, aerospace technology, transportation, and materials handling.

This type of arrangement allows power technology courses to be activity-oriented because students already possess some basic knowledge and skills. Students could work with infra-red film to determine heat losses from buildings and experiment with new insulating materials such as polyurethane foam. The city student is familiar with mass transit and its problems. Cheap electric trains can be modified to run on monorails. A linear induction model monorail can be made from a drapery-opening device. A small organic digester can be made that is capable of turning table scraps or sewage into methane gas. Trash compacting and separating offers another realm of project ideas. High efficiency windmills, solar heating panels, and reflectors can be built on a small scale and tested on the roof or play yard. The list is extensive and is growing every day as a result of the knowledge explosion.[1]

Small groups of students, or an entire class, could work on one of these projects and apply their natural talent or skill as a specialist. Other "specialists" in the group would be close at hand and allow an interaction of students and their ideas. Faculty resources in other departments should be called upon when their specialized skills would be helpful. From a sociological point of view, this interaction is also desirable.

The confines of project and problems in power technology courses should be limited only by the building, equipment, and safety. The investment for such a course would be minimal. Small portable power tools and a variety of unusual materials would be the mainstay of such a course: belts, pulleys, gears, small electric motors, wire, bolts, rivets, brazing equipment, pillow blocks, hydraulic pumps and cylinders, pneumatic devices, and a small operating budget to buy unusual parts as the need arises. Some laboratory experiments would be carried on outside the school and use common items found in the home. Utility bills, a thermometer, and a ruler would be used to measure the size of an apartment or home and the temperature inside and out for comparison with utility bills. Students would determine how efficiently their home is heated and probably determine areas of heat loss.

Some readers might call this a consumer-based form of education, and they would be correct. Power and energy are commodities that will be costing much more in the years ahead. The intelligent consumer will know how to conserve energy and utilize efficiently the energy he must use. This consumer approach to education should permeate down through the lower elementary grades.

By working together as a class or in small groups, students will become less dependent on the elusive "they" and more dependent on his neighbor. Communicating with, working with, and playing with, are things city students must learn to do more of. The elusive "they" should become the personal "me" or "we." This type of involvement in the problems of the city, which are essentially caused by people, will only be solved by the people of the city. The involvement of students in the understanding of problems caused by or related to power/energy generation is one small step in the right direction.

The individual teacher is the key to success in such a program. The teacher's main job becomes one of stimulation and organization. He must be enthusiastic and able to transmit this to his students. A good knowledge of all the basic industrial arts areas and a diverse background in power would be essential. Individual creativity and diverse experience coupled with the others will round out the requirements. A teacher who meets these requirements would undoubtedly have a high measure of success.

Essentially, what has been proposed is an expansion of the study of power around problems of the city. There is a need for the basic nuts-and-bolts approach with a comparison of engines and motors as well as their operating characteristics in power mechanics to continue. Power technology courses should build upon this base, utilizing problem-solving methods and subject material that is a part of city life.[2] In this way, students will learn how to solve real technical problems and, in the process, become more aware and astute members of the city's society.

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Urban Transportation Environment

Louie Melo

At the outset, we would all agree that problems related to the numerous phases of modern urban transportation environments are very extensive and complex. Numerous studies have been funded by local, state, and national agencies in attempting to find solutions to urban transportation and environmental problems.

The purpose of this paper is to identify some of the pertinent interworking relationships between man, his major transporting vehicles, and their effects on the general environment as they may be viewed by educators working with students learning about transportation mechanisms (automotive, busses, railways, etc.).

The literature tells us that during the last three decades the transporting of people within an urban area by traditional busses, subways, and railway systems has declined from nearly 23 billion to less than 8 billion people per year. On the other hand, the use of the private automobile has increased significantly. As a result, millions of dollars have been spent to investigate the possible development of safe, attractive, comfortable, and high-speed ground transportation systems that would again attract large numbers of people and alleviate urban automobile pollution and traffic snarls. The California Bay Area Rapid Transit System (BART) that will operate within the 75-mile Oakland-San Francisco-Richmond bay area is one such system. It is costing in excess of 1.3 billion dollars. Even though, at this writing, a small part of the system has been placed in operation, it is much too early to indicate that this system will attract people in large enough numbers to warrant the expenditure and provide the answer to this area's urban transportation and environmental problems. Operational data several years hence will surely tell the story and perhaps play a significant role in helping to direct the action of other urban transportation planners.

LIVING PATTERNS

The designing and location of a modern public transportation system in relation to the residential density of an area is an important consideration. Studies indicate that nearly 80% of the trips within an urban area either begin or end at the residence of the dweller.

Other reviews will indicate that, during the last several decades, the populated areas have evolved from a rather dense multi-level apartment compact urban culture to a fragmented urban-suburban pattern. A review of metropolitan areas revealed that the living style selected by people was as follows: single-family housing, 69%; two- to four-family housing, 16%; row or contiguous housing, 3%; and apartments, 12%. These living patterns would logically tell us that expensive public transportation systems cannot easily be designed to be within easy walking distance of large population concentrations, and as a result, central collecting stations that incorporate extensive parking facilities seem to be the design of the day.

Urban transportation planners face other problems. Almost simultaneously, while they are striving to plan attractive and, hopefully, economically-sound mass transit systems, the highway designers are gobbling up more community land for faster and more efficient highway systems. Transit planners also know that the highway designers are talking about the automated highways or guideways and the future automated family car with self-driving computer-controlled devices, thus eliminating most of the human stresses and safety problems the operator may encounter.

PEOPLE GOING PLACES

E. C. Machey, Director of the Bureau of Transportation, and Ivan Bertha, Director of the Research Division, Department of Commerce, State of Michigan, have presented some very significant data relating to people going from a point of origin to a destination through the use of the private automobile or public conveyance (busses, trains, and others). Some of their research data provides insight into this discussion.

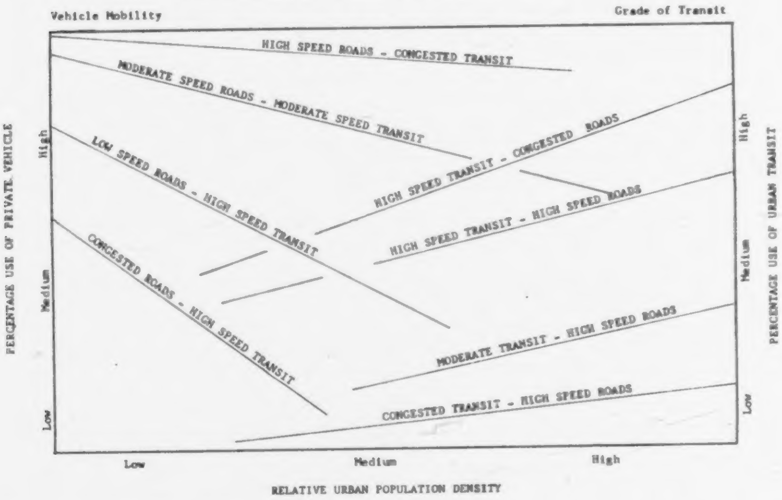
1. Their research indicates that Americans are so accustomed to the high level of private car mobility, speed, and directness of travel from point of origin to selected destination that they are very reluctant to exchange this mobility with the more restricted traditional public transit system travel.
2. In addition, the private vehicle will provide comfort, air conditioning, personal music selection, and other built-ins that its owner may wish.

In short, their study indicated that people are willing to make a substantial monetary sacrifice and endure reasonable roadway interruptions to avoid the need to drive or walk to a transit station, wait for transit cars, follow non-direct routing, and accept the crowded conditions, stop-starts, and other human stresses associated with group movement.

Many of these variables must be introduced when planning expensive high-speed public transit systems that can only be justified if used by a substantial segment of the urban population. Simultaneously striving to satisfy the private automobile owner by designing extensive high-speed highway systems often introduces some significant economic variables. As we have noted earlier, the private automobile is still the most popular mode of transportation. Individuals more often point out that they live 30 easy minutes from their place of employment, rather than saying that they must travel 60 miles per day.

In attempting to summarize what may cause people to select one mode of travel as opposed to another, the writer is presenting a graph that hopefully identifies the relative use attraction that roads, as opposed to transit systems, may hold.

PROBABLE RELATIVE USE OF URBAN TRANSPORTATION SYSTEMS



THE AUTOMOBILE vs. PUBLIC TRANSIT

Our previous comments do not indicate that the private automobile is free of travel problems. We all know that as an area's population density increases, the private vehicle's ease of mobility decreases. Therefore, rapid increases in population density without comparable vehicle highway or freeway development has, in many areas, nearly stifled the high mobility and desirability of the private automobile.

In a like sense, the popularity of a public transit system would have to include its ability to become a pleasant and efficient people-moving system that will, in effect, overshadow the desirable attributes of the automobile.

Following this logic, it seems apparent that people would be prone to switch from the private automobile to public transit if or when the private automobile encounters extremely severe congested or mobile conditions, thus making the use of the automobile very impractical as opposed to an available well-planned transit system. Each community must plot its own transportation graph, as problems differ from one community to another. Carefully developed graphs, as shown, would present the planner with the desired guide lines, if quantitative values are established for the selected urban areas.

ENERGY—PART OF THE ENVIRONMENT

Since nearly all of modern man's daily activities are supported by some form of external energy, it seems appropriate to identify its major source. A report presented by Kenneth Weaver (National Geographic, November 1972) identified our energy sources as follows: from petroleum, 39.6%; natural gas, 35.1%; coal, 20.1%; hydro-electric, 4.0%; nuclear, 0.6%; and geo-thermal, less than 0.1%. His compiled data, in effect, tells us that nearly 82% of our current energy comes from hydrocarbon fuels (natural gas, gasoline, fuel oils, coal, and others).

In addition, it is very important to note when studying about the broad spectrum of hydrocarbon fuels-using equipment that nearly 50% of the fuel's potential energy is wasted or lost during the operation of such equipment. While some of these losses, such as mechanical friction and temperature control, are unavoidable, others, such as work-load balance, mechanical operation, inefficiencies, incomplete combustion, fuel vaporization, improper fuel selection or utilization, and others should continually be subjected to additional review.

For example, if man could develop fuel-using devices that would, in effect, always deliver to the combustion chamber the ideal balanced fuel-to-air ratio and the fuel blenders provided pure hydrocarbon fuels that would oxidize (burn) in total when ignited, the by-product of such mechanisms would be only carbon dioxide (CO_2) gas and pure water (H_2O). Yes, if this were possible, our urban planners would only have to concern themselves with the physical flow of people-moving devices, and our air pollution problems would only include the nitrogen oxide problem.

Since nearly all of our transportation needs are directly or indirectly dependent on hydrocarbon fuels and man has not, as yet, developed the perfect fuel and/or fuel-using machine, it seems significant to identify some of the major pollutants or by-products of the most common vehicles we use. One such table identifying the vehicle emission rates on a gram per vehicle-mile scale is presented below:

Vehicle Emission Rates for Various Powerplant and Duty Cycle Combinations

g/Vehicle-Mile

Power Plant and Duty	HC	NO_2	SO_2	CO
Automobile, 1970 standard	4.6	6.0	0.27	47
Automobile, 1975 standard	0.41	3.0	0.27	3.4
Bus, Diesel, Arterial	1.65	36.3	5.2	28.3
Bus, Diesel, Downtown	2.76	54.4	5.2	50.6
Bus, Gas turbine, Arterial	0.20	10.5	5.2	4.0
Bus, Gas turbine, Downtown	1.15	12.2	5.2	6.8
Commuter train, Roots	80.0	234.0	48.0	1040.0
Commuter train, Turbocharged	80.0	235.0	48.0	240.0
Rail transit, Typical cycle (coal)	2.7	271.0	1030.0	6.75

When studying this data, it appears that downtown diesel busses are greater carbon monoxide (CO) polluters than are automobiles. However, when the data is converted to pollution per person-mile, it will present quite a different picture. For example, an automobile with a (CO) of 47 grams per vehicle-mile, transporting an average of 1.4 persons per trip, will emit a net emission of 34 g/person-mile, while a bus with a (CO) rating of 51 g/vehicle-mile, carrying an average of 10 people per trip, will have a net emission of only 5.1 g/person-mile. In a like sense, the nitrogen dioxide emission rate of 6.0 g/vehicle-mile for the automobile represents a net rate of 4.2 g/person-mile, while the emission rate of 54 g/vehicle-mile for the diesel transit bus adds up to 5.4 g/person-mile.

Also of interest is the g/vehicle-mile emission charged against rail transit systems. This represents the fuel used to generate the electricity necessary to operate such a vehicle. Note that the non-highly-refined fuels reflect the added sulfur dioxide problem that is not as significant when reviewing the more carefully-refined gasoline.

Since the major transportation pollutants are carbon monoxide, hydrocarbons, nitrogen oxide, and sulfur dioxide, a few added comments about these complex by-products are in order.

Carbon monoxide becomes a significant part of the emitted gasses when the air-fuel ratio reflects a rich mixture. This often happens during engine idling, strong deceleration, frequent acceleration movements, and rich mixture of fuel-to-air adjustments.

Hydrocarbon emissions may simply be identified as unused hydrocarbon molecules that for a number of reasons moved through the engine combustion system and were exhausted into the atmosphere. In actual practice the problem is very complex, since many of these hydrocarbon molecules are said to partially oxidize or become reoriented into new kinds of hydrocarbon molecular structures. Hydrocarbon emission is highest during engine warmup, heavy deceleration, leaking rings, and idle. As expected, carbon monoxide is also a part of the same emission.

Nitrogen oxide compounds become a significant part of emitted gasses when engines are running hot and the air-to-fuel ratio is near its full chemical balance point (14.7 to 1) or slightly on the lean side. At this point, more oxygen is available and engine temperatures are at their highest. Readings to nearly 3000°F have been recorded within the combustion flame front of a gasoline engine.

A drop in engine temperature and/or increase in fuel richness will cause a drop in nitrogen oxide-forming tendencies. A drop in engine compression ratio will also promote a drop in engine temperature.

Sulfur is simply an impurity. The amount of sulfur in modern gasoline is not very high. However, it is still a problem in some diesel fuels and very significant in most industrial fuels (furnace oils and coal) used by electrical utilities and industry. Sulfur when oxidized becomes sulfur dioxide (SO_2) gas that in turn has a strong affinity for water (H_2O), thus converting itself into a sulfurous acid (H_2SO_3) and/or sulfuric acid (H_2SO_4). These acids are very strong corrosives as well as plant-damaging materials.

CONCLUSION

As mentioned in our opening remarks, the study of urban transportation environments and systems is not simple or straightforward. We can easily identify some urban transportation systems in other parts of the world that are used to their designed capacity. A closer review of these environments may also reveal that other associated transporting restrictions are, in effect, promoting the use of the well-developed public transit system.

For the many educators who wish to extend their study of man and his transportation environments, a large number of research reports are now available through:

1. National Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
2. Department of Transportation, Assistant Secretary for Environment and Urban Systems, Washington, D.C. 20409
3. Many states have their own urban transportation and/or pollution boards.

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Technology Through Power and Transportation

Norman L. Asper

Industrial arts education generally, and the transportation area specifically, has felt the general thrust for curriculum reform that has been evident throughout the educational spectrum. Industrial arts education, as a well established and vitally important curriculum area, has been the focus of several important curricular research efforts.

The American Industry Project, funded initially by the Ford Foundation and subsequently by the U.S. Office of Education, was one of the first curricular efforts dealing with industrial arts to receive substantial support. Among the fourteen concepts identified in this curriculum project as appropriate for industrial arts were energy and transportation. These same concepts show up consistently in the works of industrial arts curriculum theorists.

Dr. William E. Warner, for example, in 1947, formally proposed six large divisions of subject matter that would reflect technology. These were power, transportation, communications, manufacturing, construction, and "several human, organizational, and administrative factors referred to as management."

Delmar W. Olson, in his book, Industrial Arts and Technology, supports Warner's six categories, but adds two more—research and services. The same support is found in a number of other contemporary curriculum theorists such as Paul W. DeVore, who takes the position that technology is the foundation and source of curriculum content and views the above categories as "man the builder, man the transporter, etc."

Most of the above curriculum efforts, however, while still in use in a number of areas across the nation, have been essentially overshadowed by the Industrial Arts Curriculum Project (IACP) from The Ohio State University. This project, funded by the U.S.O.E. and under the direction of Professors Donald G. Lux, Willis E. Ray, and Edward R. Towers, viewed the problem of industrial arts curriculum development as being faced by five major obstructions:

1. Failure to develop a fundamental structure of the field.
2. Absence of textbooks and other instructional materials.
3. Lack of appropriate laboratory facilities and equipment.
4. Scarcity of research and demonstration projects.
5. Outmoded teacher education programs.

One of the strongest elements behind the prevalence of the IACP effort was its success in surmounting the first major obstruction — "... to develop a fundamental structure of the field." Essentially, the directors of the IACP effort structured a body of knowledge which encompassed two elements of the material production process: manufacturing and construction. The area of transportation was classified under "Other Economic Activity." This classification process will be discussed later.

The transportation area of the industrial arts curriculum is a relative newcomer to the public school curriculum, not coming to a general recognition until after World War II. The area has been assigned a number of titles since that time: power mechanics, mechanics, power and transportation, transportation, auto mechanics, small engine mechanics, and a number of less popular titles too numerous to mention. There are several reasons for this. One is that the teachers in this area have near total freedom in curriculum planning. Available textbooks and materials, unlike many subject fields, lend little support to a matriculated program. What results is largely a mixture of unrelated fragments of selected trades mixed together with a random selection of newer technologies. The basic cause of this curricular smorgasbord is the lack of an in-depth analysis of the body of knowledge inherent in the transportation processes. The purpose of this paper, then, is to propose a process by which this analysis (curriculum development) might be achieved.

Any curriculum effort must be based upon an in-depth diagnosis of four fundamental elements: knowledge, society, the learner, and the learning experience.

The last two elements, the learner and the learning experience, are most important in structuring the teaching-learning processes. For the purpose of this paper, let it suffice to say that the curriculum's most appropriate area of implementation would be for an introductory learning experience implemented during the middle school, junior high school period of time.

The major focus of this paper, then, becomes an in-depth analysis of the first two elements, knowledge and society, and their implication for a curriculum in transportation technology.

The Structure of Man's Knowledge

The directors of the Industrial Arts Curriculum Project most effectively diagnosed man's knowledge as being made up of the four domains shown in Figure I. Essentially, this diagnosis portrays man's knowledge as the total interaction of formal knowledge, prescriptive knowledge, descriptive knowledge, and technological knowledge. The exclusion of any one of these domains from a concept will effectively nullify the total understanding of that concept.

The transportation element of industrial education, as well as all other elements, will obviously focus its attention primarily toward the technological domain of man's knowledge. This curricular focus, however, cannot be so narrow that the other three domains of man's knowledge are neglected. For example, one could learn the technology (knowledge of man's efficient practices) of setting a carburetor for most efficient exhaust emission control. This same person, however, would not understand exhaust emission control until he investigated the other three domains of man's knowledge inherent in that concept. It is the total interaction of all four domains of man's knowledge that provides total understanding of any concept.

FIGURE I

THE STRUCTURE OF MAN'S KNOWLEDGE (adapted from IACP)

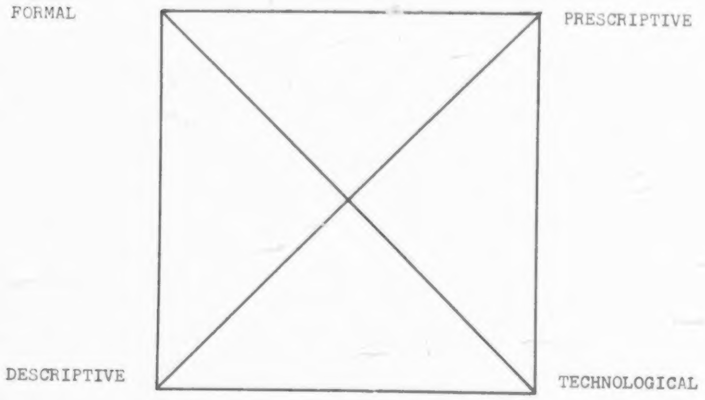

FORMAL
PRESCRIPTIVE
DESCRIPTIVE
TECHNOLOGICAL

FIGURE II

THE STRUCTURE OF HUMAN SOCIETY (adapted from IACP)

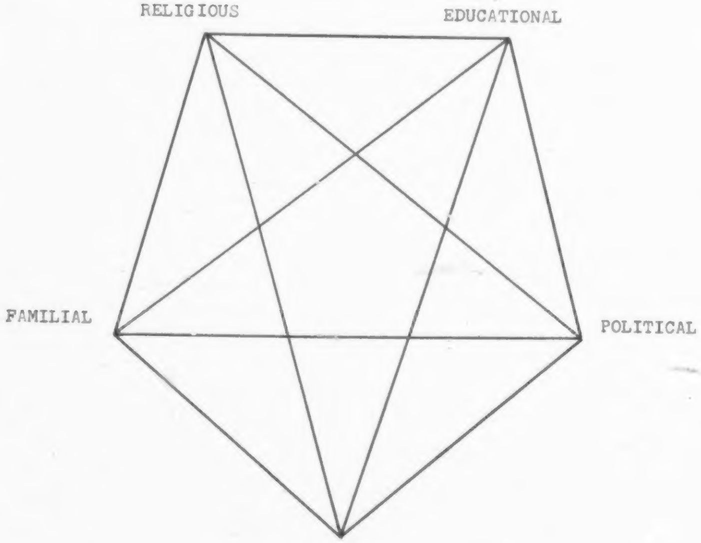
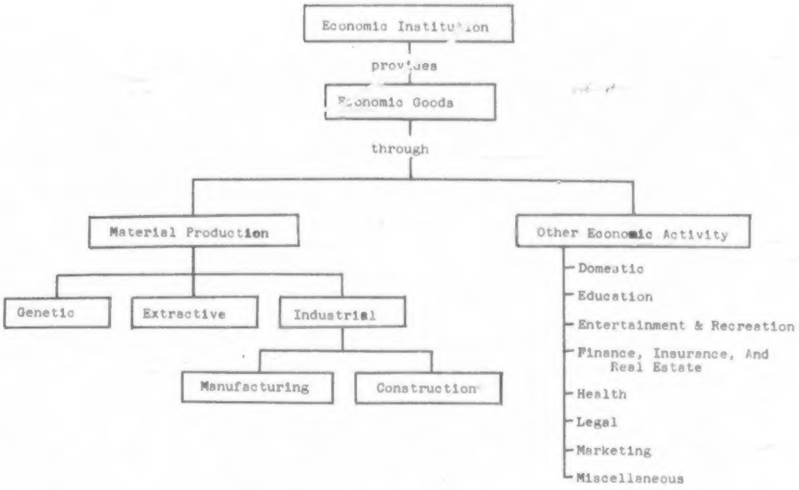

RELIGIOUS
EDUCATIONAL
FAMILIAL
POLITICAL
ECONOMIC

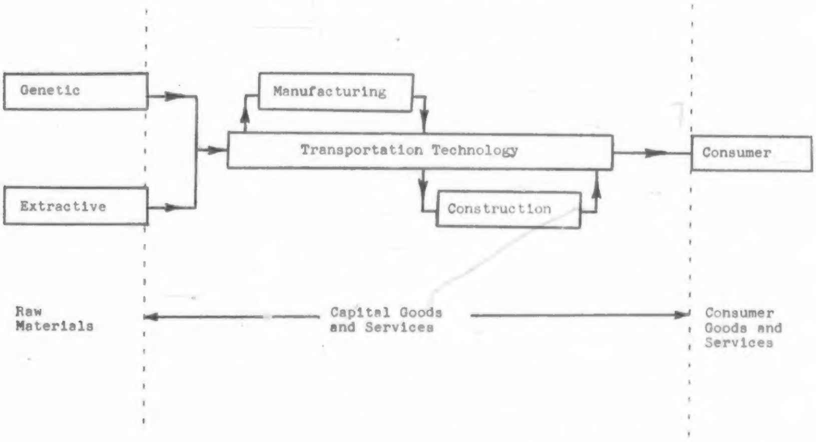
FIGURE III

THE STRUCTURE OF ECONOMIC ACTIVITY (adapted from IACP)



Economic Institution
provides
Economic Goods
through
Material Production
Other Economic Activity
Genetic
Extractive
Industrial
Manufacturing
Construction
Domestic
Education
Entertainment & Recreation
Finance, Insurance, And Real Estate
Health
Legal
Marketing
Miscellaneous

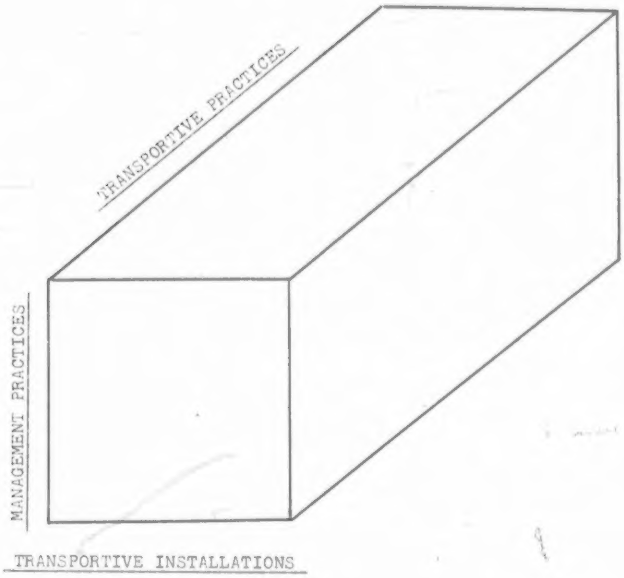
FIGURE IV
MATERIAL PRODUCTION CONTINUUM



Genetic
Extractive
Manufacturing
Transportation Technology
Construction
Consumer
Raw Materials
Capital Goods and Services
Consumer Goods and Services

FIGURE V

FIRST ORDER MATRIX OF TRANSPORTATION TECHNOLOGY



The Structure of Man's Society

The second element that must be diagnosed for effective curriculum development is the structure of man's society. The directors of IACP also effectively diagnosed this element. This diagnosis recognizes the five generally-accepted categories of human society as the familial, the political, the educational, the religious, and the economic. Essentially, this diagnosis points out that the character of any human society is the result of the type of total interaction of these five elements. This interaction is portrayed in Figure II.

The major benefit of this diagnosis, as far as curricular purposes are concerned, comes with the analysis of the economic institution to the next level of specificity.

The fundamental structure of the economic system shown in Figure III indicates that the manufacturing and construction processes are conceptualized as a sub-element of material production which provides economic goods for the economic institution.

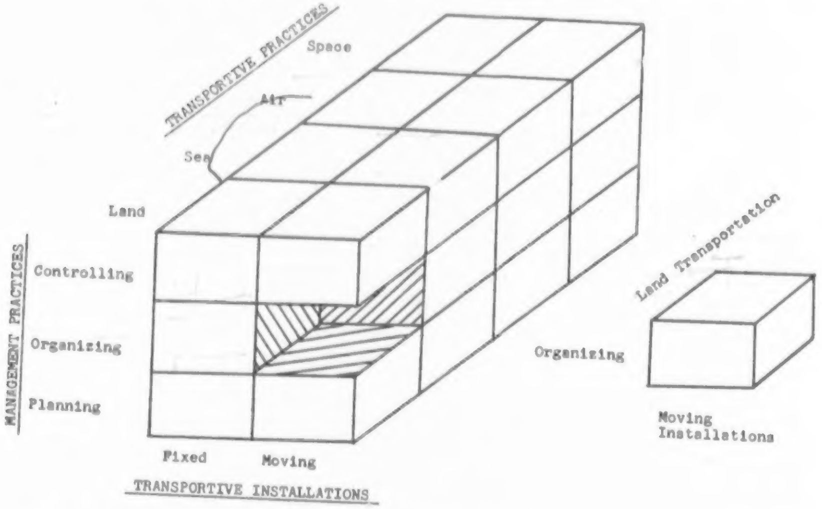
When viewed as a continuum, as in Figure IV, material production becomes linear in nature, allowing one to view the process through the economic elements of Capital Goods and Consumer Goods. The interaction between the elements of the material production process as it moves capital goods from their origin to their destination is quickly evident. This continuum also points out the total reliance of the material production process on a transportive system that for the purpose of this study is defined as transportation technology.

Transportation Technology Curriculum Proposition

From these first two diagnostic elements, then, one can effectively define the philosophical parameters of a curriculum entitled Transportation Technology. For the purpose of this paper, the curriculum will be defined as follows:

FIGURE VI

SECOND ORDER MATRIX OF TRANSPORTATION TECHNOLOGY



Transportation technology is the study of man's efficient practices that provide movement of capital goods through the material production process.

It seems most logical that this curriculum could be developed through a conceptual taxonomization of the management practices which affect transportation practices which, in turn, are applied to various transportation installations. This conceptual analysis can most appropriately be portrayed through the use of a three-dimensional matrix, as shown in Figure V. The management practices which fall along the vertical plane of the matrix affect the transportation practices which fall along the longitudinal plane. These, in turn, affect the nature of the transportation installations which fall along the horizontal plane.

The taxonomization process through the use of a three-dimensional matrix takes on a great deal more meaning when the matrix is plotted to the second level and third level, as in Figure VI. The totally inclusive and mutually exclusive elements of each plane now divide the matrix into independently discernable elements. Each of these elements can then be lifted out of the original matrix for analysis to the next level of specificity. In Figure VI, for example, the element of "Organizing Land Transportation Practices for Moving Installations" has been removed from the matrix. This element, as well as each of the others, can then be divided into its totally inclusive and mutually exclusive sub-elements.

It is possible to carry this analysis to any level of specificity, thereby providing a complete curriculum appropriate for any desired student level. If, as was stated earlier, this curriculum would most likely be implemented in the middle school or junior high school setting, then through a thorough diagnosis of the learner, the decision of the appropriate level of specificity could be made. Therefore, although this paper directs its efforts toward transportation technology, the principal analytical device seems to have potential applications not only to any area of subject matter concern, but also to any level of sophistication.

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Space Age Power and Transportation Systems Should Be Provided in Our Curriculum

Clarence Ash

Industrial arts education has increasingly attempted to aid students in interpreting technology, its development, role, impact, and consequences for man and society. Space technology began with the evolution of aircraft and has moved dramatically forward in the development of reusable spacecraft and permanent laboratories in orbit to providing significant advances in nearly all fields of science and engineering. Space age power and transportation systems have provided the means to accomplish many missions that were thought to be the dreams of the irrational not more than a generation ago. It was only yesterday that I heard the mysterious put-put of the buzz bomb which reminded me of a badly missing Model-T Ford on its way to raise havoc with London. That was a long time ago in comparison to today's space technology.

The National Aeronautics and Space Act of 1958, which established NASA, states that the general welfare and security of the United States require that adequate provision be made for aeronautical activities and that these activities be conducted so as to contribute materially to one or more of the following objectives:

The expansion of knowledge of phenomena in the atmosphere.

The improvement of the usefulness, performance, speed, safety, and efficiency of aeronautical vehicles.

The preservation of the role of the United States as a leader in aeronautical science and technology.

The most effective utilization of the scientific and engineering resources of the United States in order to avoid unnecessary duplication of effort, facilities, and equipment.

The concerns of NASA in aeronautical research are directed to the investigating vehicles and power plants that use the Earth's atmosphere to sustain them in flight but to include space vehicles that depart from, or land on, the earth. This research has proven concepts by means of flight research, extended the art of space technology, identified future requirements and needs, and solved problems connected with current operational and developmental aircraft. An aeronautical research data bank is maintained by NASA of not only their materials but those generated by outside agencies resulting from NASA-funded programs at universities or with industries.

At this point in time, man has walked on the Moon, made scientific observations there, and brought back to Earth samples of the lunar surface. Unmanned scientific spacecraft have probed for facts about matter, radiation, and magnetism in space, and have collected data relating to the Moon, Venus, Mars, the Sun, and some of the stars, and reported their findings to ground stations on Earth. Spacecraft have been put into orbit around the earth as weather observation stations, as communications relay stations for world-wide telephone and television networks, and as aids to navigation. The space program has accelerated the advance of technology for science and industry by contributing many new ideas, processes, and materials.

Space launch vehicles have been designed to investigate the upper atmosphere (earth to 4,000 miles in space), space probes, orbital manned and unmanned missions, and deep-space probes to other celestial bodies — our Moon or another planet. Each member of the launch vehicle family has been assigned appropriate missions. These have ranged from scientific research and exploration to, and including, manned space flight projects. They range from the Scout using solid propellants in four stages capable of launching a payload of 240 pounds into a 300-nautical-mile orbit or carrying a 100-pound scientific probe about 7,000 miles into space to the three-stage Saturn V capable of placing 285,000 pounds, yes, better than 140 tons, into earth orbit or send almost 98,000 pounds to the moon. A liquid-fueled first stage powered by five F-1 engines burns kerosene and liquid oxygen. First stage engines burn for about 2-1/2 minutes to an altitude of 36 miles and velocity of 6,000 miles per hour. The five engines consume 15 tons of propellant a second and produce 7.5 million pounds of thrust. The second stage is powered by five J-2 engines burning hydrogen-oxygen for 6-1/2 minutes to push the spacecraft to an altitude of about 100 miles and near-orbital velocity of 17,400 miles an hour. The third stage of the Saturn V has a single J-2 engine which ignites to give the Apollo spacecraft the final shove that places it into earth orbit at an altitude of about 115 miles. The engine shuts down and at the proper time will be used for continuing the trip to the moon. At the precise moment, the third stage engine is re-ignited to accelerate the spacecraft from its earth orbital speed to about 24,600 miles an hour to overcome earth's gravity.

These space flights are benefiting man through the development of power generation with constraints not encountered on earth such as limited size of spacecraft, lightness of weight, low fuel consumption, and the requirement to operate in an airless environment. The silicon solar cell converts 8 to 10% of the available solar energy to electricity and has proven to be the most economical and feasible solar energy conversion source. NASA scientists have been engaged in efforts to develop new type batteries and to improve the performance of existing batteries.

The batteries and solar cells were not adequate for manned space projects. The fuel cell offered the best solution. There has not been found a suitable commercial application for the fuel cell, so it will have to await the development of an efficient cell that will directly or indirectly convert hydrocarbons and air into electricity. The requirement continues for adequate power for safe exploration of the space frontier through the use of many different sources of energy development or techniques of energy conversion.

Today's Developments Are Aimed at Tomorrow's Solutions

The satellite or space vehicle provides a new approach for coping with the problems posed by deteriorating environment, dissipation of natural resources, and expanding population. It provides the means to visualize Earth in relation to the total air-ocean-land system. The Earth-orbiting satellites can gather data directly on the condition of the atmosphere and oceans, on agriculture and geology, and on man and many other living things.

NASA's Earth Resources Technology Satellites (ERTS) can obtain the comprehensive data needed. The particular advantage of satellite observations is that they can be repeated frequently enough under identical lighting conditions to yield a record free of the aberrations which have troubled conventional aerial studies. Gross geologic structures, evidence of health or sickness in forests and feed crops, soil types, land-use patterns, telltale marks of oil seeps, evidence of ground water, pollution scars on the environment, and trends in urban sprawl are features that can possibly be revealed by the satellite through the use of multispectral sensing such as color infrared film, rather than regular color film. On color infrared film, diseased trees stand out in blue while healthy trees appear in red. The ability to observe and measure the phenomena that affect our everyday life rapidly, globally, and accurately is becoming increasingly important.

Helicopters are finding increasing application in solving heavy-lift transportation problems in industry. The Sikorsky S-64 "Skycrane" has been successfully used in moving drilling rigs to offshore platforms, dismantling and erection of steel transmission towers, ship-to-shore delivery of containerized cargo, and aerial construction of prefabricated building on a mountain top.

Engineering airport access is being provided systems engineering assistance to John F. Kennedy Airport from mid-Manhattan to the problem of passenger, baggage, and mail distribution into, out of, and within the airport complex.

There have been several contributions toward safety in transportation. The development of grooved paving on runways reduced dangerous hydroplaning and has since been used on highway curves to reduce accidents on rainy days. Research continues in solving problems connected with clear air turbulence, noise, and wing trailing vortices shed by large aircraft, jumbo jet transports, causing limitation on landing and departure rates.

This is but a sampling of the contributions from advances in space technology which are improving the environment for man. Industrial arts has a stake in these developments.

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PROFESSIONAL PUBLICATIONS

Tips for Writers

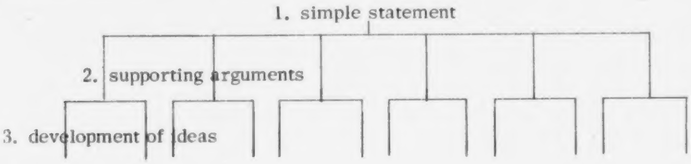
Colleen Stamm

HOW TO WRITE A MAGAZINE ARTICLE

Check the publication you are interested in to see what type of articles they ordinarily print and who the readers are. The ads might give you a clue here — companies tend to advertise in publications which reach their potential customers. Make sure your topic, approach, and style fit the readers of the magazine.

For a publication with a theme set-up, check the up-coming schedule and production deadlines for each issue. If there are no set themes, either read several back issues to get a feel for it or ask the editor for a list of saleable topics.

Organize your ideas. It's a good idea for most people to use index cards or scratch paper — one card per idea. Then you can arrange the ideas in logical order and you have an automatic outline for the article.



Steps in Writing an Article

1. State your main idea in one simple sentence.
2. Write out as many supporting arguments as you can think of — still in simple sentences. You may not actually need all of these ideas, but too much material is better than not enough once you start writing.
3. Develop these supporting arguments, still on index cards, one argument per card. By this time, you should have a paragraph or more explaining each point.
4. Arrange your arguments in logical order, so that each idea supports the one before it and leads into the next. You will begin to see the value of the cards at this point!
5. Be sure that your arguments lead logically to your conclusion, which will be that simple statement that you started with.
6. Write the first draft of your article on a regular sheet of paper, adding transition material so that no gaps will be left between your ideas. See that the argument from the first card flows smoothly into the next. It's better to leave out some of your ideas at this point than to force them in where they don't belong simply because you thought of them.
7. Pay special attention to your title and first paragraph. These are the showcase of your article. Make them attractive, or readers (and editors) will tend not to read any farther. Start with a bang — startling statement, paradox, human interest, etc. — then hold the reader's interest by developing the idea.
8. Ask a friend for an honest criticism.
9. Rewrite (as often as necessary).

Style

Each publication has its own special style, and you have a much better chance of getting into print if you can match that style. Before you start writing, curl up with several back copies of the magazine and read them carefully from cover to cover.

The style of a magazine is the result of the editor's effort to satisfy the needs of the readers. As you read the back issues, try to visualize who those readers might be. This part of the problem will be easier with professional publications; you know, for instance, that M/S/T readers are industrial arts teachers. But go farther than that in your analysis. The magazine is designed to cater to people who teach industrial arts at any level (kindergarten to graduate school) and people who supervise industrial arts teachers. Also, the majority of M/S/T readers will be jr. high-high school teachers.

Keep that picture of the reader in your mind. What would he be interested in? What kind of vocabulary does he ordinarily use? (Remember that language suited to a graduate school textbook is not likely to be read in a magazine.) What experiences are common enough in his life that you can safely use them as illustrations? What are his pet peeves? What does he hold sacred? (Handle those points with care!)

The content of your article will also help to determine your style. A research paper will necessarily be more formal than a how-to-do-it article. A discussion of classroom experiences might tend to be humorous, but you had better be serious and sincere when trying to defend your pet theory. A touch of human interest usually helps to keep the reader's attention; just be sure to avoid sentimentality, especially when describing handicapped students.

NEVER pad your article with unnecessary words. They increase the printing cost without adding anything of value. (Unless the editor cuts them out, of course.) Some common examples of padding are "the reason for this was because," "as was mentioned previously," "stated in other words, ...," and anything else that could be erased without changing your meaning. Redundant expressions belong in the same category. (The lion roared loudly – how else is it going to roar?)

Most topics are best handled in a speaking style. Imagine yourself face to face with that typical reader you pictured earlier. This will probably help you to avoid scholarly affectation. The danger here is that most people tend to ramble when they talk. To avoid that pitfall, take your finished article and imagine yourself face to face with the editor. Then cross out anything the editor wouldn't approve of – padding, irrelevant side remarks, etc.

But don't worry too much about the editor. As long as you have a clear idea of who your readers will be and make sure your style is suitable for them, you and the editor will be on the same team.

Aside from that, the best rule is KISS (Keep It Simple, Stupid!)

Words

Choose your vocabulary carefully. Many words have emotional overtones, either in themselves or in certain combinations. As a writer, you have a responsibility to your readers. Say what you mean, neither more nor less.

In a technical article or a straight news story, never use loaded terms. Your readers should be able to trust you to give them the facts without adding opinion through emotional terms that they might not recognize.

Even in editorials and argumentative features, don't over-do it. Heavy use of loaded terms gives your writing the impression of sensationalism and tends to frighten off the thinking reader.

EXAMPLES:

You report that some people went into the principal's office. Does it make any difference whether you call them a group or a mob? Whether you say they walked in or stormed in?

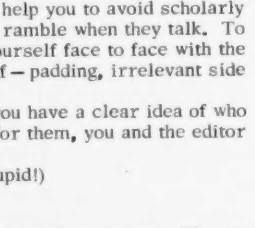
Your school (with 3 industrial arts teachers) tried out a new curriculum structure. Are you justified in reporting simply that 2/3 of the teachers involved dislike the new structure, without stating how many were involved?

A large group of students from a neighboring school is bussed in for a special program. Should you mention the length of their hair in your article?

The courts recently integrated your school. Will it help the situation if you write about "salt and pepper dating?"

Feature Articles

Most magazine articles fall into this category. In general, they have a lead paragraph designed to catch the reader's attention, a middle section (the bulk of the article) which develops the writer's ideas, and a conclusion which should stick in the reader's mind to make the article unforgettable. The hardest parts to write are the lead and conclusion.



Most articles designed for M/S/T are expository (telling about something you don't expect the reader to be familiar with) or argumentative (trying to convince the reader of something). Other common types of articles would be instructive (how to do something) and descriptive (a variation on the expository article, but more geared to a "you are there" reaction in the reader).

The lead is your showcase. The reader will see it as an indication of whether or not the rest of the article is worth reading. What type of lead you use will depend on the topic and your personal writing style. For an expository article, look over your material and choose the most striking fact at hand. It might suggest feelings of pleasure, alarm, curiosity, etc.; the important thing is its ability to catch and hold the reader's interest. Think about that striking fact until you are sure what its reaction will be in most readers; then magnify it. Choose your words and supporting facts so that the impact of that initial fact will glue the reader's eyes to the page. For instance, suppose you have developed a new program that gets amazing results. Don't start by saying that you have a new program. Describe the results so that the reader will want to know how you got them!

In an argumentative article, you might start out with a paradox to get the reader thinking or with a graphically-described example of whatever you are arguing against. If it is a topic of current controversy, you might start by describing the impact of the wide-spread disagreement. (Be careful here; it takes a long time to get an article published, and a short-term crisis might look foolish by the time it reaches the readers.)

You might arrange your middle material in logical or chronological order, depending on the topic. This is the workhorse of your article. It doesn't have to be spectacular, but it must fulfill the promise of your lead.

A conclusion is NOT a summary; leave the summaries for dissertations and other scholarly works. The function of a conclusion is to leave the reader with a feeling of satisfaction that the article was worth reading and worth remembering; a rehash of something he has just read might leave a feeling of boredom.

As with the lead, pick out one fact from your material. This time look for whatever will have the most impact on the reader's life. Using the example of a newly-developed program, you might suggest ways of implementing the same idea, with another enticing reference to its value.

Keep the conclusion as short as possible, but be sure to leave the suggestion that the reader should act on the ideas in the article in some way. If the ideas are not worth action, the reader might subconsciously decide they are not worth remembering, either.

How-To-Do-It Articles

Your lead paragraph should be an argument for the importance of whatever you are trying to teach in the article. No one is going to spend time reading your instructions for building a better mousetrap unless you first convince him that it really is better (or easier, or cheaper, etc.).

Analyze the readers of the publication and be sure of what their background is like. If you are writing for teachers who are all highly skilled in the field, the bare specifications will be enough. If you are describing a project for elementary students that is likely to be read by average elementary teachers looking for a rainy-day change of pace, remember that some of your readers might not know how to use a saw.

Visualize the entire project from beginning to end. What preparations are needed in the lab? What materials must be available? What tools are required? How long should it take with beginners? With an advanced class? What safety precautions should be taken? Be sure to answer these questions for your readers, with the amount of detail depending on who you expect your readers to be.

Move through the project in a step-by-step fashion. Put each step on a separate index card first, because most people tend to forget at least one step in the process the first time round. When putting the parts together, be sure that everything you take for granted at any point has been either made in another step or listed in the materials and preparations section.

If the project is the least bit complicated, provide either diagrams, sketches, or photos, whichever will make the best illustration. Your friendly art teacher might help with the sketches. See that diagrams and sketches are done in black ink; pencil or colors might not photograph well, and you can't always depend on the printer's art department to get all your details right.

Photo Journalism

Any article is improved by appropriate photos. If you supply them, you have at least some control over the first impression a reader will get when he opens the magazine to your page. If you don't supply them, the editor will plug in a photo from a general file. It might pertain to the subject of your article, but there's no guarantee that it will give the impression you want.

You don't need the world's most expensive camera, but it might pay to beg, borrow, or steal a reasonably good one for the occasion. Polaroid photos have the advantage of letting you see exactly what you have while there is still time to try again, but they are one of the printer's pet peeves; they are notoriously hard to coax into a good reproduction. An instamatic camera is almost foolproof for the amateur photographer and gives a reasonably good snapshot; the trouble is that the negative comes out too grainy to blow up much larger than a shapshot.

Always use black and white film unless the magazine regularly uses color photos. Most professional publications can't afford the luxury, and color photos just don't look as good when they are reproduced in black and white.

Unless your budget is unlimited, don't waste your film snapping everything you happen to see. Write the article first, analyze it, and decide which points you want the reader to remember. That's what you want to get on film.

Once you have decided on a subject, put in writing what you want the reader to think (and feel) about it. Then think of as many ways as possible to get that reaction in the reader by showing him a picture. For instance, suppose you are writing about an innovative program you have developed. You want the reader to understand the program and to have positive feelings about it, perhaps to try it himself, or at least to look for more information. Take your camera to class and look at your students as a stranger would. Forget about the finished project unless you can catch a student putting on the finishing touches with a triumphant expression on his face. Look for any point in the process where students are likely to show intense concentration. Show any unusual process or equipment. If the program involves visits to industry, take the camera along and record student reaction to what they see or student participation if the situation allows a hands-on experience.

Keep your pictures as simple as possible. Avoid cluttered backgrounds. Use the view-finder to look at your potential picture as critically as an editor will later. Move close enough with your camera to cut out everything except what you actually want a picture to show. This not only cuts down background clutter; it makes your subject as large as possible, which allows the editor to make it as large as possible on the page without getting blurred outlines. (Large pictures have a stronger emotional response in the reader.)

NEVER take a picture of a large group when it is possible to convey the same idea by using one representative person. NEVER line up all your subjects in a row unless you want to give the reader the impression of boredom.

Keep in mind the general style of the magazine or newspaper the picture will reach. A photo which would be perfectly appropriate for Playboy might not have much chance of publication in M/S/T.

If your subject is vertical and you can't avoid a cluttered background on both sides of the main subject, don't worry about it. The editor will cut out the clutter for you. But if you have a cluttered background on all four sides of your subject, move closer; always get your main subject as large and clear as possible.

If you have facilities for making large prints, do so. If not, it might help to send the negative along with your snapshots. This allows large reproduction. Both photos and negatives can be returned after publication. Just one thing — request it in writing when you send in the pictures. Editors are only human, and they will keep closer track of the pictures if they know you want them back.

You will ordinarily be in a better position to write a caption than the editor. Write it on a small piece of paper and tape it to the BACK of the photo. NEVER write on the back of a photo with anything harder than a magic marker; if you crack the emulsion, the picture will be ruined. Never use staples or paper clips on a photo for the same reason. Don't make any attempt to mark the picture for cropping. That will be decided by the layout, and most editors have been trained to do it properly. If you have already marked the face of the picture your way, you might make the editor's job much harder, even if you don't permanently ruin the picture.

Photo credits will ordinarily be given if the photographer is identified.

Titles

A magazine article is not a dissertation. You don't have to make your title a mile long in the effort to tell everyone exactly what is in the article. That sort of thing discourages almost everyone except graduate school professors.

Don't worry about a title until you are finished writing the article. Sometimes you will find that your whole emphasis has changed in the process of writing, so that your original title idea just doesn't fit after all.

The ideal title is short enough to be read in one eye-span, even in large type. That way it might catch a few extra readers as they flip through the magazine trying to decide whether to read it or file it in the trash can.

It should be catchy enough to pique the reader's curiosity. (Don't take the titles on these pages as samples — they are intended to serve as a quick reference guide for people who have already decided they want the information.) Look through your finished article for a paradox, an unusual descriptive phrase you came up with, anything that makes this article different from all the other articles that might be written on the subject. That's your title.

Be sure that the title matches the tone of the article. A flippant title leading into a philosophical discussion will fail to attract the right group of serious readers and will leave many who like the title too disappointed to read the article. That is one good reason for hunting through your article to find the hidden title.

Manuscript Preparation

All manuscripts should be typed double space, using one side of the paper only. (Editors and reviewers appreciate the space for writing notes on the page, and you can't be sure that they will turn the page over to check the back!)

Each manuscript should be accompanied by a cover letter to the editor. It must include your name and address; anything beyond that is up to you. If the topic or approach is unusual for that publication, you might want to start by explaining why it is appropriate. If you have done special work in the field, you might mention it. If the article is intended for a special issue, by all means say so. For M/S/T, you should mention your professional title and place of work; that way the editor won't have to either call you or guess when preparing the manuscript for typesetting.

Number each page of the manuscript. That could avoid disaster if the typesetter drops it and scatters the pages.

Some editors want your name on each page of the manuscript. DON'T do it for M/S/T; we have found that the review system works better when the reviewers have no way of knowing who the author is, and your name will just have to be covered up before the manuscript leaves the office.

All art (diagrams, sketches, etc.) should be camera-ready. That means lettered in black ink. Pencil and typing do not reproduce well.

Photos should be top quality, showing action whenever possible. That could be anything from quiet human interest to a construction project in full motion; just don't line people up in a row unless you are illustrating a police line-up. If your picture shows motion (a blurred hammer swing, for instance), don't worry about it. But be sure that everything else in the picture is sharp and clear. Check the magazine you are writing for to see if they can use color photos. Ordinarily they will appreciate black and white.

Always submit two copies of the manuscript, one for review and one to keep in the office in case the review copy gets lost in the mail. (That does happen occasionally!)

If you want the manuscript returned, include a stamped, self-addressed envelope. All most editors will ordinarily send you is either an accept or reject notice, but they will return the manuscript with that envelope as a reminder.

Keep a copy yourself. In spite of all the post office reforms, you can't really be sure it will reach the editor on the first try. And sometimes the editor will call or write to ask a question about "the third paragraph on page 6"; that's hard to answer if you don't have a copy handy.

What to Expect After You Mail the Manuscript

The following applies to M/S/T manuscripts in particular, but most publications will have a similar routine.

When your manuscript reaches the editorial office, the editor gives it a quick once-over. If it looks reasonable, one copy is filed and the other is sent with a routing slip for review by three members of the advisory board. They do not know who the author is and do not see each other's reviews. Sometimes an article arrives which is completely unrelated to industrial arts education or which is unacceptable in style. These might not even go out for review.

The author is immediately sent a form letter acknowledging the manuscript. If only one copy was submitted, another is requested. (Our office duplicating facilities are VERY bad.)

If the topic is of random interest, an accept/reject decision is made as soon as all three reviews reach the office. This might take several weeks, especially during vacation, exam time, or near Christmas. The author gets a notice immediately. If the manuscript is designed for a particular issue, no definite decision will be made until time for typesetting. That isn't procrastination — we have a limited amount of page space, and articles are chosen on the basis of quality, not time of arrival. But be sure to send your manuscript in early; a rush notice on the routing slip isn't the best way to put the reviewers in a good mood!

Sometimes the reviewers will suggest ways in which the article could be improved. If they want more information or a complete overhaul of the article, it is returned to the author with their suggestions. This often results in a much better article, since the author might be too close to his material to notice when something is left out. This is another reason for submitting your article early; if the reviews and the typesetter's deadline arrive on the same day, that doesn't leave time for revision.

The editor goes over the manuscripts to be published; padding is cut out, grammar and spelling are corrected, sometimes sections might be rearranged to put them in a more logical order. They are marked for typesetting and sent on their way.

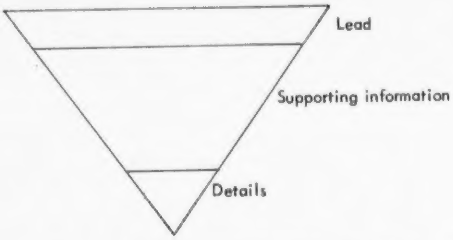
When the galley proofs arrive, the layout is made and the authors are notified. Waiting this long to contact the authors prevents the disappointment of someone being cut out after notification because the page length was estimated wrong.

Each author gets three complimentary copies as soon as the issue comes off the press.

NEWSPAPER WRITING

Structure of a Newspaper Article

Always use the inverted pyramid style with a straight news article.



The lead paragraph should be short, but crammed with information. Use as many of the 5 W's (who, what, when, where, why) as possible without making your lead clumsy and hard to read. Note that "why" should be factual if the information is available. Otherwise forget it; don't publish your opinions as straight news. Often it might be good to add another "W": What difference does this news make to the reader? For instance, many readers might not give a second thought to Marland's new position in the Office of Education unless you point out that career education funding is largely his pet project and no one seems too sure yet about whether his new position is powerful or just a figurehead title.

The main part of your article will be supporting information, arranged in order of importance. This is a concession to the pressures of modern life; if your readers only have time to look at the first part of your article, they should still get the most important information.

Unimportant but interesting details should ordinarily be left until the end of a news story. This is your defense against the editor. Sometimes there isn't quite room on the page for the entire story. If you have used the inverted pyramid style, the editor will recognize it and cut out the least important part. If you haven't used this style, the editor will have to make a judgment about what is important, and you might not agree with the decision.

Straight News

A newspaper's reputation depends on the ability of the reporters to state exactly what happened, without adding their own opinions or prejudices. Everyone expects opinion on the editorial page, but the readers have a right to depend on unbiased reporting of the news.

When investigating a news event, get all available information, and GET IT STRAIGHT. When in doubt, check another source. You won't necessarily publish all of your information, especially if you learn something which would hurt another person and reporting it would do no good, but a reporter with a broad knowledge of the subject can usually turn out a better story than someone with just a few facts.

Be sure in your own mind about the line between what actually happened and what you think might have caused it. Your opinion doesn't count in this type of writing, unless it leads to another source of definite information. Be critical of your articles, especially when you have strong feelings about the topic. It is very easy to use emotionally loaded language without intending to, simply because you feel involved.

Avoid bias in your coverage of news. Don't ignore an important event simply because you don't approve of it and then give exaggerated emphasis to your pet project. If your readers don't have another source of information handy, your choice of topics is a sneaky way of imposing your opinion on them.

Keep your language simple. The function of a newspaper article is to communicate news, not to give a vocabulary lesson. Remember that most of your readers haven't seen a dictionary in years and don't intend to start now.

Feature Articles

This is your chance to do some interpretive reporting, muckraking, or anything of the sort. A feature article is closely related to a magazine-type article. It can and usually does include opinions and therefore always has a by-line. (The publication doesn't claim to hold the same opinions.)

Most features in commercial papers are exposés; in the educational press, they are more likely to be word pictures of an outstanding person or program.

All features have a definite structure: a lead paragraph designed to catch the reader's attention, a middle section (the bulk of the article) which develops the writer's ideas, and a conclusion which should stick in the reader's mind to make the article unforgettable. The hardest parts to write are the lead and conclusion. See the section on magazine feature articles for more details.

Interviews

The simplest (and least interesting) type of interview article is the "enquiring reporter" list of unrelated responses to a question. It might supply a good cross-section of views, depending on how you went about choosing your people, but the article is likely to be somewhere between rambling and dead.

An interview can be conducted in person, by phone, or by mail. In any case, have your questions written out well in advance, let the subject cool off in your mind, and then go over your questions again to make sure they still sound reasonably intelligent and cover the field reasonable well. You might be surprised! Above all, don't interview an important person without written questions. Most people tend to freeze and forget half of the questions.

If you have a tape recorder and it doesn't make your subject nervous, use it. Otherwise, take notes. If you don't take shorthand, try to remember the symbols you used in college to keep up with the professors who just wouldn't slow down. Don't worry about getting every word. Use disjointed phrases to keep your speed up; just be sure you are picking up the most important points of what is said. IMMEDIATELY after the interview, write the article. Those disjointed phrases will make sense while they are fresh in your mind, but two days later might be another story. If you have any questions about what was said, call back and ask the person you interviewed. If the topic is at all controversial, send the article for the person to look over. You could be sued for quoting wrong.

Even if you have the questions arranged in logical order, your notes probably won't be. Some of the best parts of an interview tend to be the unexpected off-the-cuff remarks that pop into your subject's head ten minutes before or after you ask about the topic. Don't hesitate to rearrange your material, to put it into logical order before submitting it for publication. The only danger in this process is that a controversial statement might be taken out of context and thus changed in its most obvious meaning. When in doubt, ask the person who said it.

Don't use the question-and-answer format too often in your articles. Just take the information and make a feature of it.

Columns

This is the free-for-all of journalism. There are no rules. Well, practically none. The important thing is that the column should be appropriate for the publication for which it is written. For instance, anyone writing a gossip column about movie stars would have a hard time getting it published in the AIAA periodicals!

A column is a serial-type bit of journalism. The only common characteristic is that the entire series should be written by one author; its style is so personalized that it would change into something else if someone else took over.

In a specialized publication like an IA newsletter, the column should be tied in some way to industrial arts, or at least to a common interest of industrial arts teachers.

Columns can range from strictly business (The Researcher's Index, for instance) to humor (Art Buchwald), from topics of national interest (Drew Pearson) to personal problems (Dear Abby). The topic and style of a column should be determined by the interests and personality of the writer and by the needs of the editor.

Once a column has been established, keep it coming. It should appear in every issue of the publication. If it is any good, the readers will look for it, and no successful publication disappoints its readers any more than necessary.

Each column should have a standing title. If it is always about the same topic, this is enough; however, it is extremely hard for most writers to keep writing on the same topic without repeating the same thing. Ordinarily you will need a standing title and a headline which refers to the topic in this issue.

The editor should see that the column is easy to recognize. This can be done in several ways. You might keep it in the same position in each issue (beside the editorial, for instance). If your typesetter has a wide variety of type styles available at no extra cost, you might use a distinctive type or column size (for instance, the editorial is usually set in a larger type and a wider column than the rest of the publication). Very often you will find a cap rule (┌────┐) over the title. You might use an appropriate sketch (the same in every issue) or a photo of the author beside the title. A screen block (see the columns in M/S/T) is also an attention-getter.

NEWSLETTER EDITING

How to Get Newsletter Material

Don't just wait for it to come to you!

The ideal situation would be for you to have a group of reporters covering the state for you. This may be possible — make as many contacts as possible at state conventions, teachers' meetings, etc. Let people know that you are interested. Be as specific as you can about how an article should be written up; many people would be willing, but don't know how to start to write. After you make the initial contact, follow it up. Keep the names and addresses of all who have promised to write. If you don't hear from them in a reasonable amount of time, write and ask questions. You may have to write the article yourself from information they give you, but at least you will have the information.

For those with time and money to spare, travel might be the answer. If you cover a news event yourself, you are sure to get the story.

Keep in touch with your state IA supervisor. He probably won't have time to write articles himself, but he can tell you what is going on. From that point it's up to you. Call or write the persons involved until you have enough to make a good story.

Try to get on the mailing list of every high school or college paper in your area. They won't all have material you can use, but it's worth a try.

Check every teachers' organization in your area which might have IA teachers among the members. Very often they have newsletters which might help you.

Read the Monitor. You have many readers who don't belong to AIAA, and you are free to pick up anything you think would interest them.

Follow up on any clue you get by the grapevine, but be sure to check it out thoroughly before publishing the information. Facts have a way of getting confused when they travel by word of mouth.

Make your own news. For instance, interview local businessmen about their view of industrial arts education and compare it with what actually exists. Get them enthused about helping IA teachers and then write up what they do as a feature. Send out a questionnaire about what changes should be made first if and when the federal funding comes through. Contact local people with an IA background (besides teachers) and see what value their education has had for them. Use your imagination to come up with a variety of articles that would interest your readers.

The Editor as Manager

Unless you do all your own writing, photography, printing, etc., you had better have a good grasp of some basic principles of management to avoid chaos. It is your job to coordinate the efforts of several very different groups of people and turn out a first-class product for still another group of people.

Writers (both reporters and creative writers) tend to work in spurts unless they are full-time professionals whose income depends on a regular schedule. Unfortunately, editors must have a regular schedule. Put it in writing, including early enough author deadlines to give you time to prod anyone who doesn't turn in a promised article. Give copies of the schedule to anyone who might be likely to write for you, and emphasize the importance of maintaining those deadlines.

Since some people are early with everything, set up a filing system so that when you get material that you can't use for another two months, you will have a definite place to keep it until needed. I would suggest a series of file folders, each clearly marked for a definite issue during the year, unless your publication is strictly news. In that case, one folder would probably do, since the idea is to use everything as quickly as possible.

When you ask a writer to work on a definite topic for a definite issue, keep a carbon copy of the request in that file. If the deadline gets close with no word from the writer, ask him about it. He may have forgotten.

Keep an "idea file" for emergency use. Every time you get an idea about something that might be good in your publication, write it down and file it. When you get some free time between issues, dig into the file and develop some of those ideas. This helps to prevent last-minute panic when the typesetter's deadline arrives and the writers' contributions don't.

Keep your production material separated from your teaching supplies. You don't have time to search through the classroom when your galley proofs arrive from the typesetter.

Get to know your writers if at all possible. The same goes for typesetters, printers, etc. Good communications usually lead to good results.

Speaking of typesetters, look up the standard proofreaders' marks. Memorize them and use them when preparing your manuscripts. They not only save time, but you have a better chance of getting what you want if you know how to ask for it.

Get together with the printer and extend your production schedule to include each step of the typesetting and printing process. Once you get that on paper, both you and the printer are likely to work faster instead of blaming each other for delaying publication.

At the risk of sounding corny, remember that you can catch more flies with honey than with vinegar. You can't threaten a volunteer, anyway, so you may as well rely on good will to produce the cooperation you need.

Editorials

No serious publication is complete without an editorial, nothing else is so calculated to influence public opinion, and practically nothing scares the inexperienced editor so much. Don't hesitate. Master these simple rules and take advantage of the power of the press.

First be sure you have something important to say. Go over the material printed in the rest of your publication, current events which are important to your readers, other publications on similar topics. Boil down your message into one simple statement. If that is impossible, write as many editorials as you need, but never confuse the issue by trying to say two different things at once.

Look at your statement objectively. Take two pieces of paper and label them for and against. Now line up all possible arguments for and against your statement. Remember that some of your readers will disagree with anything more controversial than motherhood and apple pie, and you had better refute their arguments before they have a chance to think them up.

Your argument will be more believable if you give the impression that you don't have an opinion, if the reader thinks your conclusion was his own idea. Be subtle about it. Start out with the arguments against your own opinion. Of course, you don't have to make them look good! Choose your words wisely. Many have emotional reactions which will sway your readers without their being aware of it. For example, when you approve of the results of majority rule, it is a democratic process; when you don't, it is mob rule. When statistics support your argument, you report 90% (or whatever) agreement; if they don't support you, it is simply a majority. Above all, don't ignore any possible argument against you; give it first consideration, and make it look unimportant in the process.

Then (just to be fair, of course) go over the supporting arguments. Make these as favorable as possible without being too obvious. Remember that the idea is to look impartial.

Finally, after both sides have been presented, you might state your opinion in a very low-key style, pointing out that it seems to be the only logical conclusion after considering all the evidence. If it really is the only possible conclusion, you might not even have to be that obvious about it. Remember that the reader should think it is his own conclusion.

One final caution: Don't let this style creep into any news articles you may write. NEVER use emotionally loaded language in an article intended to state facts. Don't try to influence opinion outside of the editorial page. If you tend to confuse opinion with news as a general rule, any reader who thinks as he reads will soon lose confidence in your publication as a source of unbiased news.

Accept/Reject Dilemma

Assume that you are lucky enough to have more material available than you have room for in the publication. How do you decide?

First, you DO NOT decide on the basis of who the author is unless you always have something from the president of the association (for instance) and this rather poor article is all you have from him. In that case, print it and have a long serious talk with him about how to turn out good articles for future issues. In case of desperation, maybe you can talk him into giving you his ideas early, letting you write the article, and then checking it to be sure it was what he meant to say.

For all other material, first consider who your readers are. List all possible special interest groups (classroom teachers, teacher educators, supervisors, administrators, etc.) and the geographical boundary served by the publication (state, region, etc.). Ideally, each issue should have something of interest for each group and each part of that geographical area. Realistically, just do the best you can. Be sure that you don't overload your publication with articles that interest you and reject articles designed for other groups because there isn't enough space for everything.

When you have two or more articles on the same topic, choose between them solely on the basis of good journalism. The version you choose should contain the most complete information, be designed for your particular type of publication, and appeal to your particular group of readers. Don't even consider who the author is. It might be hard to reject your best friend's manuscript, but an editor must be able to do it.

Don't ignore the articles you decide not to publish. Whether or not you acknowledge all articles submitted is up to you; it could be a serious burden on you, but the authors would appreciate it. By all means, contact everyone who sends you news if you do not intend to print it. It's enough to say that space limitations don't allow you to print all material submitted, although you could go into more detail if you have the time and inclination. Never ignore your writers; a little effort in public relations goes a long way in establishing a steady flow of news.

Padding

Anything that doesn't belong in an article is padding. Get rid of it before sending the manuscript to the typesetter.

The most common type of padding is just poor style on the writer's part. You can often improve a manuscript by going through it and crossing out such expressions as "it is interesting to note that...", "at the present point in history," "as mentioned previously," "it should be pointed out that..."

Another type of padding is affectation—using words a mile long or a complicated phrase when a simple word would do the same job. For example, cross out "a wide perceptual divergence" and write "differences of opinion." It won't save much on the typesetting, but most of your readers will get more out of it. Cross out "at this point in our history" and write "now."

Some people (especially recent graduates) feel that every article should begin with a survey of the literature on the topic and/or a description of the way in which their information was gathered. That's fine for a term paper, but you can consider it pure padding. If you must print the literature survey, limit it to a bibliography at the end of the article.

Sometimes you will get a copy of a speech. Cut out the author's gratitude for the opportunity to address such a distinguished group, remarks about the weather, jokes intended to warm up the audience, and anything else that wanders from the main point. Above all, cut out anything even slightly off-color. Words in print tend to offend people much more easily than the same words coming from a speaker's platform.

Cut out anything that could be interpreted as libel. You really shouldn't have to worry about this one, but if it shows up, remember that editors and publishers can be sued just as easily as authors.

Many authors are so eager to make a point that they tend to be redundant. It might be a combination of like terms (The blade swished fast.) or it might be an entire thought expressed two or more times. Choose the most expressive wording (swished) and cross out the other. In the case of ideas repeated in different words, the second version might add something. Try combining the two sentences (or paragraphs) without changing the author's style.

Be especially wary of adjectives. Some authors tend to pile them up as if they were being paid by the word. (For example, the bright, clear, sparkling sunlight—bright says it all.)

A word of caution: If you have a magazine format, you might get some really creative writing for it. Give serious thought to every word you cut from this sort of article. If the author is good, there will be a reason for every word in that manuscript. Unfortunately, most editors of professional publications don't face this problem very often.

Headlines

A headline is not a title; it is a declarative statement. Whether your format is newspaper or newsletter, you are supposed to be carrying news. Your headlines should reflect that.

The only unbreakable rule is that a headline must include a verb (although sometimes it may be implied, as in the 1945 newspaper that simply said "PEACE" across the front page).

Resist the temptation to be a creative writer and impress people with flowery rhetoric. That has no place in headlines. Also avoid sensationalism. Some commercial newspapers use it as a general rule, but examine their contents. They are struggling to sell copies to people with a comic-book mentality. You are writing for educators.

If you have a newsletter format and don't want to bother with headlines, at least tell your writers to pick out the most important fact in their articles and write a short clear statement of it as a headline.

If you have a newspaper format and do your own layout, consider headlines as a blessing. They have a marvelous ability to fill all sorts of odd bits of space between articles if you know how to compose them well.

First, be sure you have a good set of type samples from your printer—preferably with a sample of each size of each type face stretching across the page. You can count out the letters and spaces of your headline against the samples and get a good approximation of what size type you will need in each case. Your printer can teach you a more exact method, but it's not always worth the trouble.

A headline should cover every column of the article, and is ordinarily one to three lines long. Make them long or short according to your layout.

As for content, the headline should point out an outstanding aspect of the story. It is usually the most important point, but could call attention to a detail which makes the story important to the readers of this publication. Make sure that the tone of the headline matches the article; this is the first thing the readers will see and the last thing they will remember.

Copy-Fitting

Since typesetting is so expensive, it is important to know exactly how much copy to set for your publication. This method might leave full-time editors shaking their heads, but it works reasonably well.

Take an average copy of your publication. Type out one full column of material, matching line for line. Draw a line marking the average length of the typed column, along the right side. Every time you type out your material on that typewriter using margins set to that line, your material will come out approximately line for line with the printed copy. Just count out how many lines you will get per inch or per column or per page and judge how much material you have accordingly. Remember to count on space for headlines or titles and pictures if you use them. DANGER: If you change typewriters, type size or style, or column width, start over.

If you find that you have too little copy set, don't panic. A little white space never hurt anyone, especially if you work it in as part of the layout. Also, remember that photos can be printed in a variety of shapes and sizes; this fact can be a life-saver.

If you have too much copy set, see if anything is timeless filler-type material. Keep it for another issue. If your type face is fairly large, you might pick out an off-beat article or two and ask the printer to photographically reduce them. It will look as if you are calling attention to them by the difference in type size and column width.

Libel

> "A malicious publication which exposes any living person or the memory of any person deceased, to hatred, contempt, ridicule or obloquy, or which causes or tends to cause any person to be shunned or avoided, or which has a tendency to injure any person, corporation, or association or persons, in his or their business or occupation, is a libel." (New York Consolidated Laws)

The following three elements must all be present for a publication to be sued for libel:

DEFAMATION — Generally defined as injury to reputation, it must apply to an identifiable person, and it must be published.

IDENTIFICATION — Unless the plaintiff can actually prove that the defamatory meaning applies to him, there is no libel. A third party must understand that the reference is to the plaintiff, whether by nickname, pseudonym, or circumstances. It follows then that fictitious names be as far-fetched as possible. The third party may be a single person and one who is related to the plaintiff.

PUBLICATION — Printing, posting, or circulating are the first steps in publication; someone reading or hearing the message are the second steps. Most courts subscribe to what is called the single publication rule. This means an entire edition of a newspaper or magazine is treated as a single publication of one copy, rather than every single copy constituting a distinct separate case of libel. The second step is taken when the libel reaches the mass of readers for which the periodical was intended — not just a small segment of it.

Both writers and editors can be sued for libel, although the blame usually rests with the writer. One cure is "preventive journalism" — double-check the accuracy of all information before writing the article and again before publishing it if there seems to be any derogatory material included.

To be doubly safe, use the quote technique when in doubt. Print a direct quote from your authority if at all possible. That puts the responsibility where it belongs: at the source of the information. Some publications report "alleged" happenings. This doesn't always work; the publication could be sued for accusing someone of something.

Absolute accuracy doesn't always help, either. There is a classic case of a newspaper being sued for printing a birth announcement. They didn't realize that the husband was in service and had been out of the country for over a year.

When in doubt about an article, ask the person you are writing about to check it for accuracy. You don't have to let him rewrite it; just get a written statement in advance that what you have written is accurate. Although he could change his mind and sue later, you will have strong evidence that you tried to do a good job.

A printed correction in the next issue is no defense against a libel action, but at least it would demonstrate to the court that the offending publication was not printed with malice.

Misc. Bits of Wisdom

Remember the "Peter Pan Law": Prompt and decisive action will pan out, whereas caution and timidity will peter out. This law applies whenever you are faced with a minor crisis (not enough material to print, not enough money to print it, etc.).

To assure failure, attempt creativity by committee. Committees are fine for routine work, but if you have an idea for improving your publication by making a more or less radical change, do it yourself.

A flourishing publication is always pro-reader. People get scolded and preached to enough without reading more of it.

Have fun at your work and produce a publication that you can enjoy. The pleasure will show through and create a happy feeling in the reader.

A good editor is an innovator, not a curator. Your publication must change (and not just keep pace) if you want to retain leadership in the field. But remember that leaders must keep within sight of the troops; don't launch such a complete revolution that you lose your readers!

If you get a good article related to an advertised product, don't hesitate to use it because of the appearance of selling out to the advertisers. On the other hand, you must keep your freedom; don't let any advertiser pressure you into using editorial space to push his product if you don't honestly believe the article would be for the good of the readers.

Sorry, but there's just no way to avoid rising paper costs. Many mills shut down during the recent mini-recession, and the experts predict that it will take a full three years to get enough new equipment in operation to catch up with the current demand. Add to that constantly rising labor costs and pressure from environmentalists to spend more money on conservation, and you know things will get worse before they get better. If a reasonably-priced printer in your area can handle it, you might consider using newsprint.

If you ever see a need for a copyright, write to Register of Copyrights, Library of Congress, Washington, D.C. 20540 and ask for copyright application blanks. You will need blanks for Class A if you have a book or pamphlet; Class B for a newspaper, newsletter, or magazine; Class C for lectures; Class I for technical drawings; Class J for photographs; or Class M for non-dramatic motion pictures. For anything that does not fit into any of these categories, ask for the general information booklet. Each application costs $6.

Ms. Stamm is Managing Editor of the American Industrial Arts Association publications.

SPECIAL EDUCATION

Industrial Arts for Exceptional Children

William D. Wargo
David B. Freundlich

Industrial arts for exceptional children is a relatively rare occurrence in our public schools. Furthermore, not many industrial arts teachers have the background or training for teaching these children. At Florida State University we recognized these problems and two years ago developed a program of industrial arts for exceptional children at Astoria Park Elementary School in Tallahassee. Before further describing this program, however, let us identify who are exceptional children.

WHO ARE EXCEPTIONAL CHILDREN

There have been several attempts to define the term "exceptional child." Sometimes it is used to refer to the particularly bright child or to the child with unusual talent. Other times it is used to refer to any atypical or deviant child. The term has been generally accepted, however, to include both the handicapped and the gifted child. In education, a child is usually considered exceptional if he deviates to such a degree that it interferes with his development under ordinary classroom procedures, thus requiring special education either in conjunction with a regular class or in a special class or school. A general breakdown of major deviations can be organized into at least five categories. They are:

1. Communications disorders
    a) learning disabilities
    b) speech handicaps

2. Mental deviations
    a) intellectually gifted
    b) mentally retarded

3. Sensory handicaps
    a) auditory handicaps
    b) visual handicaps

4. Neurologic, orthopedic, and other health impairments

5. Behavior disorders

In August 1970, the planning and evaluation staff of HEW's Bureau of Education for the Handicapped estimated that there were 75,000,000 children in the United States from birth to 19 years of age, of which an estimated 7,083,500 are handicapped. These figures include preschool children and indicate that slightly over 10% are handicapped. The Bureau's estimated percentages of school-age children according to categories of handicaps are:

Speech impaired	3.5%
Emotionally disturbed	2.0%
Mentally retarded	2.3%
Learning disabled	1.0%
Hard of hearing	0.5%
Deaf	0.075%
Crippled or health impaired	0.5%
Visually impaired	0.1%
Multihandicapped	0.06%
	10.035% of children ages 5-19

Further data was gathered by the Bureau concerning the percentage of school-age handicapped children who are receiving special educational services. These data are as follows:

Type of Handicap	Total Number	Percent Receiving Services
Mentally retarded	1,360,737	52%
Hard of hearing & deaf	316,456	21%
Speech impaired	2,180,589	51%
Visually handicapped	66,679	34%
Emotionally disturbed	767,108	13%
Crippled	192,662	33%
Other health impaired	1,089,817	15%
Multihandicapped	35,918	26%
National Totals	6,009,966	2,258,395 (38%)

At Astoria Park, we teach industrial arts to only three categories of exceptional children. These include the visually handicapped, the mentally retarded, and the learning disabled children.

THE VISUALLY HANDICAPPED

Most of the visually handicapped children at Astoria Park are visually impaired rather than blind. The difference between these classifications is that the impaired can read print, whereas the blind need instruction in braille. Medical, legal, and economic professions use the terms "partially sighted" (with vision of 20/70 to 20/200) and "legally blind" (20/200 and less). The latter classifications are used less frequently in education because a significantly large proportion of the "legally blind" learn to use their residual vision and can read print.

Blindness and visual impairment affect the development of children in that they become aware of the world through senses other than sight — that is, through the senses of hearing, touch, and smell. Although the tactile sense is primary and is used extensively by young blind children, many objects cannot be perceived through touch either because of physical inaccessibility or because of social restraints. For example, hills and mountains, space, and the relations of large objects to one another remain a mystery to blind children. Most of these objects are explained to the child orally or by analogy to what he can hear and feel.

Kevin Davis cuts out his laminated salad bowl spoon as Bill Boyette demonstrates the proper way to hold the saw.

THE LEARNING-DISABLED

The second group of children we deal with at Astoria Park are those with specific learning disabilities. These children often appear quite normal in most respects, but have marked disabilities in one area or another. There are boys and girls who appear mentally retarded but have normal abilities in some areas. They may be delayed in learning to talk or in understanding spatial relations or in comprehending what is said to them. Because of the heterogeneous nature of "learning-disabled children," the concept of "specific learning disability" has been hard to define. Numerous labels have been used, employing such terms as "minimal brain dysfunction," or "central processing dysfunction," or "perceptually handicapped children." Specific disabilities have been labeled "dyslexia" for severe reading disabilities or "aphasia" for children who are delayed in learning to talk. The field of learning disabilities has been viewed from various perspectives by psychiatrists, neurophysiologists, psychologists, speech pathologists, and educators. In general, the definitions of learning disabilities fall into two broad categories: (a) those definitions involving functions of the central nervous system (i.e., perception, conceptualization, memory, attention, impulse, motor function) and (b) those definitions placing emphasis on the behavior or learning disorder without specific reference to central nervous system causes (i.e., language, reading, writing, arithmetic).

THE MENTALLY RETARDED

The third group of exceptional children we teach industrial arts to is the mentally retarded. Physicians, psychologists, educators, sociologists, geneticists, and others have evolved their own classifications of children with low intelligence. As a result, it is easy to become overwhelmed with such terms as feeble minded, mentally deficient, slow learner, mentally handicapped, mentally retarded, idiot, imbecile, moron, educable, trainable, totally dependent, custodial, and many others. Educational programs usually divide the classifications into the three categories of: (1) educable (IQ 50-79), (2) trainable (IQ 30-50), and (3) custodial (IQ below 30). The educable mentally retarded child is one who, because of subnormal mental development, is unable to profit sufficiently from the program of the regular elementary school, but who is considered to have potential for development in three areas: (1) educability in academic subjects at a minimum level, (2) educability in social adjustment to a point where he can get along independently in the community, and (3) minimal occupational adequacies to such a degree that he can later support himself partially or totally at the adult level. The trainable mentally retarded child is one who is not educable in the sense of academic achievement, independent community social adjustment, or independent occupational adjustment. Rather, he has potential for learning (1) self-help skills, (2) social adjustment in the family and in the neighborhood, and (3) economic usefulness in the home, in a residential school, or in a sheltered workshop. The custodial mentally retarded child is one who is unable to be trained in total self-care, socialization, or economic usefulness and who needs continued help in taking care of his personal needs. Such a child requires almost complete care and supervision throughout his life, since he is unable to survive without help. The educable mentally retarded children are the ones we deal with at Astoria Park.

Bobby Watkins pulls a nail out of his boat as Orland Russell observes.

GUIDING BELIEF AND OBJECTIVES

In working with the exceptional children at Astoria Park, our guiding belief is that these children have basic needs and abilities for industrial arts, as do the children who are not classified as exceptional. When this program started two years ago, the general objectives we set down were essentially the same as industrial arts objectives for any situation. Namely, they were:

1. To develop in each child skills and problem-solving abilities related to tools, materials, and processes.
2. To apply an understanding of other subjects to industrial arts, particularly the basic principles of mathematics and science.
3. To provide an opportunity to experience pride in achievement and a sense of self-realization.
4. To develop proper attitudes toward health and safety.
5. To provide opportunity to identify avocational and prevocational interests.
6. To provide visually handicapped children an opportunity to learn through non-visual senses.

STRUCTURE OF THE ASTORIA PARK PROGRAM

The program serves a two-fold purpose, in that it provides a valuable pre-service experience for our industrial arts majors, as well as providing needed industrial arts experiences for the exceptional children. To accommodate the teaching of the program, Florida State University developed a practicum course entitled "Teaching Industrial Arts to Handicapped Children and Youth." Industrial arts majors who elect the course are assigned 3 to 6 exceptional boys and girls to teach four hours a week. In addition to their teaching, the students spend two hours a week in an on-campus seminar which deals with the problems and methodology of teaching exceptional children. Approximately 10-15 industrial arts majors are enrolled in the course each quarter.

BACKGROUND OF THE ASTORIA PARK PROGRAM DEVELOPMENT

At the outset of this program in the spring of 1971, the amount of funds available were limited. Therefore, we decided to begin with woodworking, since this was a relatively low-cost area that did not require expensive or unusual tools and materials. Donations of tools, materials, and benches from the Florida State University Industrial Arts Club, local Tallahassee merchants, and the Lions Club contributed to the development of the industrial arts program. Since the initial development of the program, we have received enough funds and contributions to expand into electricity, photography, ceramics, construction, and manufacturing. Last quarter we developed another program for disadvantaged and gifted children at Riley Elementary School. Next quarter we are being asked by W. T. Moore Elementary School to begin an industrial arts program for deaf children. This will, of course, be the limit that we can extend extend ourselves, since we only have a limited number of majors we can send to these schools.

Marty Martin applies a finish and Roger Graham waits his turn while Craig Sowers explains the proper brushing technique.

INDUSTRIAL ARTS LEARNING ACTIVITIES FOR EXCEPTIONAL CHILDREN

The industrial arts learning activities for exceptional children revolve around projects which serve as the means for attaining the objectives that were stated earlier. Examples of some of the project activities include:

INDIVIDUAL PROJECTS

1. Making laminated wood salad bowl spoons and forks.
2. Constructing and wiring a set of telegraph keys.
3. Taking and developing snapshot photographs.
4. Forming and firing a variety of ceramic objects.
5. Making bricks using a brick mold and concrete.
6. Silk screening and bookbinding.

GROUP PROJECTS

1. Producing salt & pepper shakers through line production.
2. Constructing a model of a house.
3. Constructing and launching rockets.
4. Constructing CO_2 racing cars to specifications and racing them in competition.
5. Vacuum forming plastic objects.

Much has been learned from this program about industrial arts content and methodology for visually handicapped boys and girls. When this program first began, our approach was overly cautious in allowing the exceptional children freedom to work on their own with tools and materials. It has been found, however, that as the youngsters gain familiarity and confidence in working with tools and materials, they are able to perform many operations without a great deal of assistance. These children are also very receptive to safety instruction and are conscientious about the well-being of themselves and of others while working on their projects.

Before the children are permitted to work on a project, they are acquainted with a variety of tools, materials, and processes. For example, it is necessary to introduce them to the names and identifiable characteristics of common tools such as hammers, screwdrivers, saws, rulers, squares, miter boxes, etc. Practice experiences with these tools permit the children to learn the basic concepts of boring, planing, scraping, fastening, and sanding. The basic mechanics and procedures of planing and designing are also taught.

When the boys and girls attain enough skill and confidence to begin work on projects, care is taken to allow them opportunities to deliberate about the materials and procedures to be used. Thus, the projects are not totally conceived, designed, and simplified by the teachers. On numerous occasions, the teachers have taken the youngsters to hardware stores and lumber companies to further involve them in the planning and development of the projects. Whenever the opportunity presents itself, the teachers try to encourage the children to judge the problems related to their projects. Once a totally blind boy was very insistent about making a wheelbarrow. The teacher had doubts as to whether the boy really knew what it involved. He, therefore, made arrangements to take the boy to a local hardware store for him to feel a wheelbarrow. Once there, the merchant let the boy handle some wheelbarrows and suggested that the boy assemble one. The boy did so with difficulty, but with great zest and enjoyment. That experience in itself provided great satisfaction for the boy. As a result, he modified his thinking and decided a simpler project would be more in the realm of his abilities.

The opportunities for non-visual learning for visually impaired youth are numerous in industrial arts activities. Experience with the Astoria Park program has shown that working with tools and materials provides many tactile, olfactory, and auditory learning opportunities. Through the tactile sense, boys and girls have gained knowledge about geometric shapes, textures, temperatures, sharpness, moisture, pressure, hardness, and flexibility. The children have learned to identify various materials and processes in association with distinct odors of woods, adhesives, leather, plastics, dust, smoke, and fumes. Their auditory senses have comprehended the sounds of an assortment of tools, machines, and signals.

The understanding of abstract subjects, such as mathematics and science, which are normally difficult for handicapped children, is greatly enhanced in the industrial arts setting. Many concrete applications of measuring and of scientific phenomena such as speed, friction, leverage, expansion, strength, etc., present themselves.

Perhaps of greatest significance in the Astoria Park Program are the contributions industrial arts makes to the wholesome development of the exceptional children's emotional feelings and personality. The children develop more enthusiastic and self-confident behavior as they begin to discover industrial arts experiences. Pride in achievement is easily recognized as the boys and girls enthusiastically inform teachers, parents, brothers, sisters, and friends of their latest accomplishments. Self-realization is experienced as they become more inventive in the use of their own initiative and mechanical intelligence. Their disabilities have presented difficulties when working with certain tools and materials. However, as they develop skill and confidence in working with tools they become less easily defeated. Some of the youngsters become irate at themselves when they encounter difficulties, but insist on solving the situation themselves.

Exceptional children who continue to take industrial arts will be included in other enriching activities, such as taking field trips and listening to guest speakers from business and industry. This type of exposure will be good for them. Equally important, businessmen and industrialists will be able to observe that they possess interests and abilities which make them employable. Consequently, the stigma of complete disability that employers often attach to exceptional youth can be changed.

SIGNIFICANCE OF ASTORIA PARK PROGRAM FOR TEACHER EDUCATION

Needless to say, the Astoria Park Program provides an important pre-service experience for the industrial arts majors of Florida State University. The experience the students gain in working with the exceptional boys and girls is invaluable. They gain experience in lesson planning, classroom management, and with in-school procedures and activities. They learn to work cooperatively with one another and with elementary school teachers and administrators. They gain knowledge and experience with innovative approaches such as IACP activities and Piaget's inductive-verbal concept development. They also participate in a unique activity that presents many implications for the industrial arts profession and for teacher education.

The Astoria Park Program is more than just an activity in making things. It is an attempt at human growth and development. The project activities have guided the children in many directions. They have deliberated in the selection and construction of projects. They have discovered and developed new skills. They have experienced pride in achievement. And they have begun to think on a grander scale. As they continue with subsequent industrial arts courses, it is expected that they will derive more benefits which contribute to their development as knowledgeable productive citizens.

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One Step Toward Independence for the Slow Learner

Robert Marshall

Paul Staniszewski

James Pittilla

The employment orientation projects in Schuyler-Colfax Junior High School, Wayne, New Jersey, and P.S. #31, Jersey City, New Jersey, have been developed as a result of recognizing the need for realistic objectives in the educational background of the slow learner. Upon recognition of the limitations of special class students, it has become obvious that the slow learner will find employment in occupations where the major emphasis will be on the use of hands. Since industrial education programs provide opportunities for training in manipulative skills, this was a logical area for an innovative project. Our major objective is to provide a vocational program which will stress the development of salable skills within the capabilities of each student and give the self-confidence that results from the mastery of these skills.

The first step in setting up a meaningful industrial education program for special class children was to do research in local occupational opportunities. After visits to and meetings with local business leaders, focus narrowed to the plastics industry. As a result, industrial plastics forms the nucleus of the pilot project. The Educational Committee of the Society of Plastic Engineers and various packaging and trade shows proved an invaluable source of information. In addition to the need for such a program developed

Poly bagging plastic tableware.

through local industry, the Division of Employment Security presented the current and projected outlook for employment in this field.

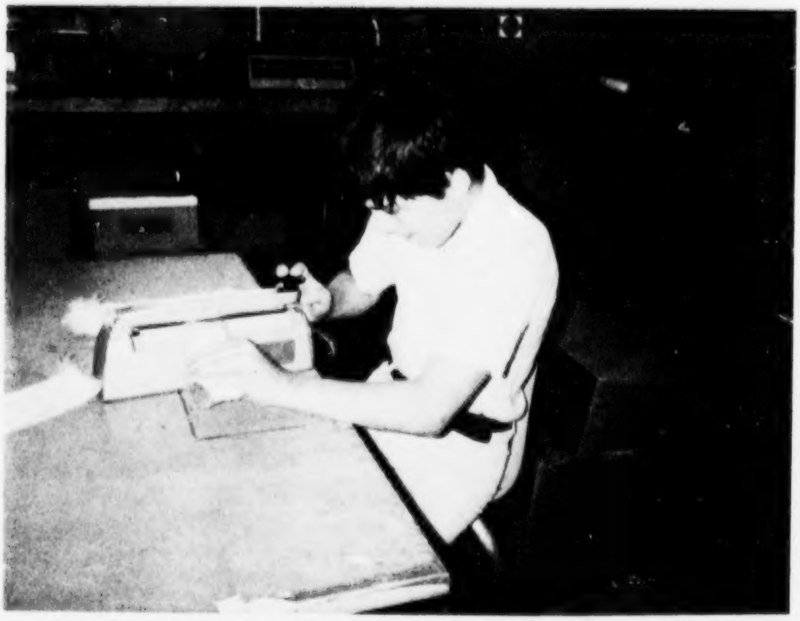
Having established the need and objectives, the pilot program was developed to relate educational experiences to the kind of training needed in terms of equipment and funds available. It was decided to emphasize plastic production techniques enabling young people to learn about the flow and control of materials, the need for quality control, and packaging operations. It was also decided to move in the direction of providing learning experiences in as many processes and kinds of equipment as possible. Equipment must necessarily be limited in size, but was selected on the basis of its ability to simulate actual industrial concepts.

The plastics production part of the program consists of two phases. First, plastic processing which includes:

1. Injection molding, which is the production of small plastic articles such as golf tees.
2. Compression molding and laminating, which is the forming of parts such as coasters.
3. Extrusion, which is the shaping of plastic into film, rod, or sheet materials for packaging.
4. Engraving, which is used in the production of laminated signs.
5. Molding with expandable styrene foams allows students to make practical articles such as duck decoys, fishing floats, bait buckets, and Christmas decorations.
6. Forming with plastisols is the forming of plastic parts like handle covers for pliers.

The second area of plastic production involves various methods of packaging of products. Typical of these activities are:

1. Blister packaging, which is the vacuum forming of a sheet of plastic into a blister. The blister is mounted on a cardboard holder to encapsule small, irregularly shaped items.
2. Shrink packaging, which involves covering a product with a thin sheet of plastic film, then placing it on a conveyor which carries through a shrink tunnel which heats the film, causing it to shrink to fit the item.



Student operating hand sealer for poly bagging.

3. Skin packaging, which is similar to shrink packaging except the product is mounted on cardboard, then a thin plastic film is vacuum-formed over the item.

4. Poly-bagging, which involves placing a product in a poly bag which is sealed, then usually stapled to a header.

In order to provide variation from production-type activities of the plastic processing and packaging, a second area was included in the program. Indoor and outdoor maintenance are occupations in which the slow learner can succeed and readily find employment. Some students eventually start a lawn maintenance business of their own.

The outside maintenance and planting phase of the pilot program consists of learning how to use hand and power garden tools, as well as the selection and care of plants. Some of the activities included:

1. Class trip to nursery in order to learn the names and prices of various shrubs and plants. Students learned to cultivate and edge plantings as well as to rototill areas for plantings, seedlings, and cuttings, and to trim and shape shrubs.

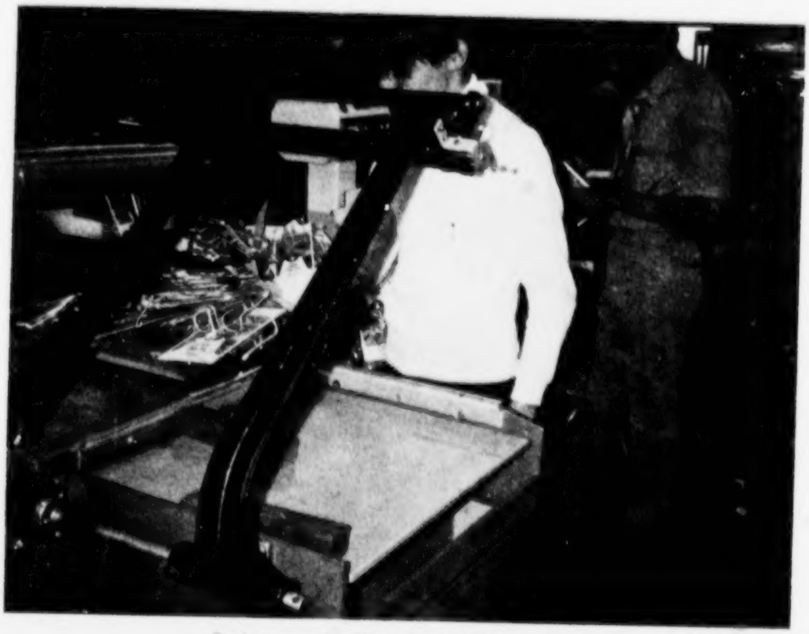
2. Planted areas were prepared for winter.

3. The special class students undertook power raking of designated areas of the school's lawns, planting and fertilizing a small lawn, and the planning and planting of a memorial garden.

4. Students utilized a power vacuum to rid the school grounds of paper, and a sweeper and vacuum to gather leaves. In the spring, they prune fruit trees.

The inside maintenance section of the program consists of maintenance of residential and commercial buildings. A few of the activities included are window washing, sweeping of floors, wet and dry mopping, floor washing with scrubbing machine and a vacuum, and waxing with a power buffer. The students receive instruction directly from the maintenance department under the supervision of the teacher.

The northern and central sections of New Jersey are termed "light industry," with many small factories and warehouses. An occupational survey of the area showed a great need for individuals experienced in warehousing, trafficking goods, and merchandising. As a result, a plan to provide practical experiences in warehousing in conjunction with the employment orientation project is being proposed. In addition to learning the prac-



Student operating "L" sealer for shrink packing.

tices and procedures of shipping and receiving, students will learn the proper use and maintenance of equipment, security techniques, inventory and filing systems, and how to store merchandise. Typical equipment will include the following: a fork lift truck, hand trucks, conveyor systems for loading and unloading, a mailing station, pallet jack, banding machines, and scales. Students will accept deliveries made to the employment orientation project, inventory and store goods, and prepare packaged products for shipment.

Shipping and receiving are industrial procedures which are suited to the slow learner. Factories and warehouses find the slow learner quite adaptable to their operation.

The Employment Orientation Program as set up in P.S. #31, Jersey City, is tailored to fit the needs of trainable rather than educable students. As a result, the tasks are simplified and nothing can be taken for granted. For instance, the lesson on learning how to wrap a small package must be started with a practice period of putting elastic bands over blocks. The paper must be cut to size and prefolded.

With the difficult steps removed, the child realizes he is doing well in his first experience. Building upon successes is the key in teaching the slow learner. Besides continual reinforcement of basic skills, the role of the teacher must include continual evaluation of the student's abilities and limitations, so that he can move within the program according to his accomplishments and adjustment. Habits of reliability, punctuality, and responsibility must be stressed, for these are the qualities which will help the student meet the demands of a real work situation.

The pilot program has proved to be a good starting point for learning in the classroom. Simple academic skills such as color discrimination, counting, sorting, alphabet, and number recognition can be effectively reinforced. With the introduction in the work-study program, classroom activities include discussion of practical topics such as how to fill out a time card, money – its meaning and uses, transportation, types of employment, social security, job applications, and letter writing.

Although the primary objective of the Employment Orientation Program is to provide the slow learner with a useful and salable skill, many other benefits have been recognized. The simulated work phase of the program is a transition period in which the child can adjust from school to employment. Given an opportunity to do work in which he can succeed, the special class student develops an attitude of self-confidence and self-respect. Being given the responsibility for his surroundings and equipment has helped provide motivation and new interests. Finally, learning to work as part of a group to complete a meaningful task has helped to develop a sense of cooperation, of responsibility, and of accomplishment.

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A Curriculum in Industrial Education—Special Education

J. Russell Kruppa
Stephen P. Hritz
Robert G. Thrower

Handicapped students are the students who have been unable to achieve successfully in regular school programs. These students have always existed and will continue to be present in the classroom. Formerly, they were isolated from their peers and were taught "watered-down" versions of existing courses. Many of them dropped out of school after they reached the age of sixteen. Today, however, there is a growing desire to recognize these students and their needs and to provide programs that will permit them to achieve to the maximum of their potential.

Educators in the field of industrial education have often had some students with special needs in their classroom, although they may not have been so designated. Generally, these students were the ones who could not seem to achieve successfully in academic courses, and one alternative was often the industrial education laboratory. It was felt that the emphasis on manipulative skills and pre-vocational and/or vocational learning was more appropriate. Also, industrial education courses offered greater opportunity for informality, direct application of learning, therapeutic release, and the possibility of a one-to-one student-teacher relationship, all of which seem helpful when working with special needs students.

Specially designed programs for serving these students at the secondary levels have been almost non-existent in the past because most teachers in special education have been prepared to work at the primary levels. Most of the limited number of teachers presently working with handicapped students at the secondary levels have either been trained for the primary levels or have been subject matter specialists who have taken limited course work in the special education area. The adequacy of this procedure for preparing the special teacher can be questioned. Sparks and Younie (1969) suggested that the teachers' lack of preparation at the secondary levels may be a reason that their students are not demonstrating "superior academic gains as a function of special class placement" (p. 16). They further suggested that special education teachers should be trained both as subject matter and disabilities specialists.

After considering the plight of disadvantaged and handicapped youth, and recognizing that the federal government considered the problem serious enough to stipulate that 25% of vocational funds be spent on programs for these youth, several faculty at Trenton State College decided to investigate the problem more critically. However, before embarking upon the development of a curriculum model that would provide certification in both industrial education and special education, it seemed appropriate to assess the need for such special teachers from the total spectrum, rather than merely a local concern.

DEFINITION OF TERMS

The following terms are defined to provide clarity in this report.

Handicapped and Disadvantaged Children: Children who deviate intellectually, physically, socially, or emotionally so markedly from what is considered to be normal growth and development that they require a modification of school practices or special educational services in order for them to develop to their maximum capacity.

Special Needs Children: Special needs children are considered synonymous with handicapped and disadvantaged children.

Special Education: That branch of education which, through special methods and practices, serves children classified as "handicapped," "exceptional," or "disadvantaged."

Industrial Education: A generic term including the areas of industrial arts, vocational-industrial, and technical education.

The significance of this project is in the ultimate use which educators will make of the proposed curriculum model which is designed for wide-scale adaptation in providing one solution to a current problem in education.

NEED FOR PRE-SERVICE PROGRAMS

To obtain a comprehensive appraisal of the needs for special dual-purpose pre-service programs, the following three major sources were included: review of the literature, meetings with concerned and qualified personnel, and a national survey of industrial teacher education institutions.

Need for Dual-Purpose Curriculum Based Upon Literature

Throughout the literature, constant mention was made of the need for special education personnel and the inadequacy of the present programs for meeting the needs of handicapped children. It was stated in 1967, in an article entitled "Education of the Handicapped," that "fewer than one-half of the nation's five million handicapped are getting the special educational attention they need in order to become contributing members of adult society" (p. 30). Martin (1970) suggested that approximately 60% of the handicapped in the nation were not receiving appropriate services. In a survey of private agencies serving the needs of the handicapped in New Jersey, Ellis and others (1968) found that one-quarter of these institutions indicated that the public school programs were not meeting the needs of handicapped students. The lack of trained personnel was the main reason cited for the inadequacy of these school programs. Smith (1971) noted that:

> to maintain adequate special education classes for the nation's seven million children with identified handicaps would require 500,000 teachers with special education certification; we have only 175,000, with little likelihood that the shortage will be met in the future (p. 30).

Jones (1971), in noting the trend toward placing special needs students in regular classrooms, made the suggestion that all teachers be given more training in special education in order that they might better understand these students.

The need for trained personnel increased sharply with the mandating of educational programs for special needs students. In 1968, New Jersey passed *Title 18A, Chapter 46, New Jersey Statutes* which declared that all handicapped children between the ages of five and 20 be identified and classified by local school districts and be provided with appropriate educational programs. Further legislation, in June 1970, defined the terms to be used in classification and identification, stipulated the procedure to be followed, named the types of programs permissible for placement, and stated other details for the implementation of *Title 18A, Chapter 46* (*Rules and Regulations Pursuant* . . . . 1970). More evidence of the concern for the education of special needs students was shown by the ruling that provisions be made for free public education for retarded children in Pennsylvania in 1972, as reported in the *Philadelphia Inquirer* (May 6).

Not only is it important to prepare more special education personnel, but their training should include a background in industrial or occupational education. Younie (1966) stated that teachers of the mentally retarded should know about the world of work and the retardates' place in that world in order to build a continuous and meaningful program for these students. Sheperd (1966) also called for the training of special education teachers in occupations so that they might be better able to provide socio-occupational experiences for secondary-level mental retardates. Bartsch (1971) noted, in his concluding statements, that industrial education training taught by special education teachers was insufficient, probably due to a lack of training. The importance of training special education teachers to know about the world of work comes from the realization that one of the needs of handicapped students is that of becoming partially or totally self-supporting. Formerly special needs students could find jobs in the unskilled area, but the number of these positions is decreasing. Many special education programs presently in existence should be re-examined in the light of the Bureau of Labor Statistics' prediction that by 1975, only one in five occupations will be unskilled (Goldstein, 1971). Haug and Rifkin (1970) indicated that a background in industrial education would permit special education teachers to train the majority of handicapped students to become useful workers. Kokaska (1971) also indicated that the retarded were capable of succeeding in craft occupations as well as in unskilled jobs.

A need has likewise been expressed on the part of industrial education teachers for training in special education. In the final report of the Seminar for Supervisors and Teacher Educators of Persons with Special Needs, Arnold (1968) stated that "vocational education has more to offer persons with special needs than any other area of study" and that vocational educators need special preparation to meet the needs of these students (p. 1). Mauchline (1968) noted that the field is wide open for industrial arts graduates "who are interested in rehabilitation and who are willing to make an aggressive and positive presentation of their abilities to sheltered workshop administrators" (pp. 136-137). Tisdall in 1964 spoke of the frequent relegation of mentally retarded students to shop courses and suggested that a cooperative program between industrial education and special education departments be established. Brennan (1968) suggested that industrial education teachers prepare for the inclusion of slow learners in their laboratories. Freels (1967) recommended that undergraduate level training be given in special education for industrial arts teachers dealing with educable mentally handicapped students. He also noted that at that time there was a lack of proper facilities and opportunities for this kind of training.

The expansion of secondary-level programs in industrial education for special needs students is receiving impetus from the Vocational Education Act of 1963 and the 1968 Amendments. The increased number of programs will necessarily require more qualified personnel. Mozenter (1972) predicted an annual 6% increase in Employment Orientation Programs through the 1977-78 school year in New Jersey. In 1972-73, there were 188 programs, with an estimated 12,800 enrollment. The expansion of these programs alone will demand a large number of personnel who presently are not available. The Governor's Advisory Committee for the New Jersey Comprehensive Statewide Planning Project for Vocational Rehabilitation Services (Ellis, 1968) advocated the expansion of work-study programs and predicted the need for a minimum of ten additional sheltered workshops between 1970 and 1975. The committee also noted the shortage of vocational education training programs for special needs students and recommended expansion in these areas. Additional positions for people trained in special education-industrial education would result if these recommendations are heeded.

Need for Dual-Purpose Curriculum Based Upon Special Meetings

During the spring of 1972, meetings with people involved in industrial education and special education were held in North, Central, and Southern Regions in New Jersey. The purpose of these meetings was to determine if people in the field perceived a need for establishing baccalaureate dual-purpose programs in industrial education-special education. These meetings included county child study supervisors, special education, vocational, and industrial arts teachers, guidance personnel, principals, the state director and supervisor of industrial arts, personnel from manpower training programs, and teacher educators. Many existing and proposed programs were discussed, each of which would require additional personnel trained in both fields. Several programs included Work Experience Programs, Employment Orientation Programs, Work Experience and Career Exploration Programs, Sheltered Workshops, industrial arts and vocational education programs for special needs students, special programs in technical schools, and mobile unit programs. It was indicated that in one school district alone, only 3% of the special needs students were being serviced adequately, and that approximately 30% of the student body required some special help. Repeatedly, it was reported that in-service teachers, while they recognized the needs of the students, often hesitate or refuse to become involved in special programs for disadvantaged and handicapped because they lack either the technical training or the special education background.

Need for Dual-Purpose Program as Reflected by a National Survey

Kruppa (1972) surveyed 160 colleges and universities in the United States which offered industrial education to determine the number and nature of programs being offered for the preparation of teachers of industrial education for handicapped and disadvantaged students. One hundred and twenty-eight of the questionnaires were returned, an 80% response. According to the survey, 110 colleges and universities did not offer programs of this nature. Eleven institutions indicated that such programs were offered, even though many were of limited scope. Seven other institutions indicated that although no formal program was offered for industrial education-special education, advisement permitted students to take a limited amount of course work in special education. The eleven which offered structured programs indicated that they were offered at the undergraduate level. Five of the eleven indicated that the program was also available at the graduate level. The total number of credit hours required for graduation varied from 120 to 142 semester hours and from 60 to 210 quarter hours. In these programs, 25 to 50 semester hours and 45 to 72 quarter hours were required in technical areas, while 3 to 26 semester hours and 10 to 36 quarter hours were required for special education courses for preparation in working with handicapped and disadvantaged students.

Evidence from the literature, a series of special meetings and interviews, and results from a national survey of industrial education teacher training institutions clearly indicates that a critical need does exist for pre-service programs through which personnel can be trained to fill existing positions and others which must be created at the secondary school level.

TYPES OF SECONDARY-LEVEL PROGRAMS AND THEIR CHARACTERISTICS

Characteristics of Secondary-Level Special Needs Programs

When considering a baccalaureate curriculum for preparing teachers, it is necessary to determine some of the characteristics of good secondary school programs in which graduates will teach.

Ressler (1971) listed the following seven characteristics of disadvantaged students which must be considered in developing programs to meet their needs: "1. poor reading ability, 2. grade retardation, 3. introversion or withdrawal, 4. hostility, 5. proneness to delinquency, 6. social retardation, and 7. physical deprivation" (p. 24). This list would suggest a curriculum which would provide students with activities which are not highly verbal in nature. These activities would be such that the students see the immediate, concrete application of learnings and the possibility of applying the learnings to satisfy their needs. The curriculum would provide opportunities for socialization and the expression of hostility in socially acceptable ways. Hewitt (1966) suggests that programs be structured to provide for multi-sensory stimulation and selected individualized experiences to aid in development of sensory and motor abilities.

Sharkey and Porter (1964) in their article "Industrial Arts for the Mental Retardate," provide a generalized picture of educational programs for this child. According to their description, an appropriate curriculum would be one in which the basic goals of self-realization, human relationships, economic efficiency, and civic responsibility are met.

Industrial education courses can meet the general needs of handicapped and disadvantaged students. Sharkey and Porter (1964) viewed industrial arts as providing the mental retardate student with opportunities for self-expression, self-competition, and pre-vocational experiences. In the informal atmosphere of the industrial arts classroom, the student receives individualized instruction with opportunities for multi-sensory experiences, therapeutic release, meaningful routine, manual concentration, and easily-achieved successes (Ressler, 1971). Nelson (1964), Viggiani (1965), and Wilson (1970) suggested that industrial arts can be valuable as a core program to bring together the academic areas in a meaningful way. Haug and Rifkin (1970) acknowledged that many handicapped students can be trained to become useful workers, and Kokaska (1971) stated that the retarded are capable of succeeding in craft occupations as well as in unskilled jobs. Job training for the special needs students can be provided through vocational-oriented programs. Ross (1971) suggested that such programs must be student-oriented with small units of instruction, individual curricula, and emphasis on behavioral objectives and success.

Types of Programs for Special Needs Students

Within the State of New Jersey, the types of educational opportunities for special needs students were named in Rules and Regulations Pursuant to Title 18A, Chapter 46, New Jersey Statutes, (June 24, 1970) Title 8, Chapter 28, New Jersey Administrative Code. Students may attend special classes or programs in regular public schools or may attend special classes or programs operated by a county vocational school in the district. The students may also be enrolled in a State of New Jersey-operated program or in sheltered workshops approved by the New Jersey Rehabilitation Commission and the Bureau of Special Education and Pupil Personnel Services. The students may also attend private schools when the district is not able to provide the services required. If students are not able to participate in any of these programs, they may receive individual instruction at home or at school. All previously-mentioned programs fit into the categories described herein.

In a pamphlet entitled "Sequence of Vocational and Occupational Training Programs for Handicapped Students," Wyllie (no date) described programs available to special needs students in both regular public schools and vocational schools in New Jersey. The Introduction to Vocations programs are designed to help students become more aware of occupations and to provide them with a basic foundation for later career and education choices. Students in these programs have opportunities to experience activities in home economics, health, industrial arts, business education, and science. They also experience a unit of study called "Know Yourself." Employment Orientation Programs present students with simulated work tasks to help them in developing good work habits and attitudes. Students in these programs are also given some basic skill training in occupational areas that they have expressed an interest in or shown ability in. Part-Time Cooperative Employment Orientation Programs provide special needs students with the opportunity to participate in part-time on-the-job work activities. During this experience, students are instructed, observed, and evaluated on their progress.

A pamphlet entitled "Work Experience and Career Exploration Program" (no date) described this option available for special needs students in the State of New Jersey. These programs are sponsored by the Bureau of Labor Standards in cooperation with the New Jersey State Department of Education. They provide school-supervised work experience-career experience activities for selected youth 14 or 15 years old who are considered potential dropouts. This type of program differs from the Employment Orientation Program in that the Employment Orientation students must be at least 16 years of age.

Ellis (1968) discussed the Sheltered Workshops in the State of New Jersey. These workshops provide the handicapped youth and adults with employment when they cannot qualify for work on the open job market because their disabilities prevent them from meeting the competitive requirements. When possible, Sheltered Workshops train the handicapped to work in the regular labor force. Presently, there are 25 Sheltered Workshops in New Jersey. All except those operated by the Commission for the Blind are privately owned.

Graduates from specialized pre-service programs granting certification in both industrial education and special education would find professional opportunities in a variety of special programs, as mentioned earlier. They would also be qualified to teach in regular industrial education programs for industrial arts or vocational education, depending upon their depth of technical training and experience.

NEED FOR COMPETENCY-BASED TEACHER TRAINING MODEL

Need for List of Competencies

A current trend in teacher education is toward performance-based certification of teachers. Daniel (1971) suggested that this trend appears, in fact, to be a response to the demand for teacher accountability as well as a desire to strengthen the profession. With this form of certification, it becomes very important that the capabilities and desired performances of future teachers be more clearly delineated.

Johnson (1968) described a number of deficiencies in teacher education curricula. One was that pre-service teachers did not know what competencies they would be expected to exhibit at the time they finished their program. Smith (1969) stated that he felt a need for the identification of the skills and competencies required for special education teachers and suggested that these be used to test pre-service or in-service teachers. Cotrell and others (1970) indicated the need for the classification and analyzation of competencies for vocational and technical educators and determined those competencies which seemed valuable and necessary. The Performance Evaluation Project in New Jersey (1971) at the time of this research was in the process of determining competencies required for 16 teaching fields. The argument for analyzation and interpretation of competencies has, in each case, been that this system would help in determining which competencies should receive important consideration in teacher training programs and curriculum development. In 1971, the National Association of State Directors of Teacher Education and Certification stated that:

> each teaching major or field of specialization should be built on a clearly-formulated statement of the competencies needed by teachers in this area of the public school curriculum. These competencies should include the attitudes, knowledge, understandings, and skills that are required, and the degree of expertise needed for a beginning teacher (p. 25).

Rationale for NASDTEC Format in Classifying Competencies

Lists of appropriate competencies were obtained through the review of literature, from colleagues in the profession, and as a result of the survey conducted by Kruppa (1972). Even though most competencies were considered useful for a performance-based curriculum model, it was difficult to utilize them in their original forms since there was no standardized classification system. In evaluating the proliferation of categories under which existing competencies were listed, it was apparent that a standardized format must be established. After considering several classification systems, the project staff chose the format used by the National Association of State Directors of Teacher Education and Certification in their publication Standards for State Approval of Teacher Education and the New Jersey Supplement to these standards. Since the competencies which were selected for use in the proposed model were adaptable to the NASDTEC classification system and because this organization is probably the most universally accepted for evaluation of teacher training programs, it appeared to be the one best choice.

Sources of Competencies

Lists of competencies were obtained from a variety of sources. Only a brief description about each source will be included in this section.

Cotrell and others (1970) generated a list of 390 competencies for vocational-technical education teachers. These were arrived at by conducting a career analysis of vocational-technical teaching. Following are the ten main categories which were presented: 1. program development, planning, and evaluation, 2. instruction-planning, 3. instruction-execution, 4. instruction-evaluation, 5. management, 6. guidance, 7. school-community relations, 8. student-vocational organization, 9. professional role and development, and 10. coordination. Within each of these categories were listed the specific competencies deemed necessary for vocational-technical teachers.

Competencies for teachers of emotionally handicapped children were developed by Hewitt in 1966. They provide a structure which, with additions, may be suitable for special education teachers in general. He divided his broadly-stated competencies under the following seven main headings: objectivity, flexibility, structure, resourcefulness, social reinforcement, curriculum expertise, and intellectual model, and then described these headings further.

Dinger (1971) discussed the matter of competencies for teachers of secondary-level educable mentally retarded students. The 41 competencies which he listed go beyond those of Hewitt, in that they suggest that the teacher have a pre-vocational background. These competencies were also much more detailed than the one proposed by Hewitt.

Scott (1967) suggested the following five broadly-stated competencies for teachers of culturally disadvantaged students: 1. proficiency "in dealing with rapidly-changing situations that arise in his classroom," 2. perceptiveness and capability " in meeting psychological needs of his pupils," 3. skill "in modifying learning experiences in the content areas," 4. responsiveness "to situations that arise in the classroom to help his pupils to acquire and practice social skills," and 5. flexibility "in decision-making" (pp. 132-134).

Melby and Regal (1972) at Trenton State College compiled and evaluated a list of 67 competencies in special education. The following are the categories under which these competencies were originally classified: 1. teacher affect, 2. teacher effect, 3. teacher characteristics, 4. teacher interaction with other school personnel, and 5. teacher relationship with parents and community.

Kemp (1966) offered the following competencies which should be considered for vocational teachers to successfully teach students with special needs: 1. subject-matter competence, 2. interest in working with these students, 3. the ability to reinforce slow-learners and respond to all students, 4. the ability to seek out new techniques for communicating with the students, 5. skill in presenting goals to students and aiding them to meet challenges, 6. the ability to measure students by individual achievements, 7. specialized training to work with the disadvantaged learner, 8. the ability to work with other school personnel, 9. the ability to gear instructional materials to the understanding of the students, and 10. skill in helping students build better self-concepts.

Through a federal grant, a comprehensive study was undertaken, and a listing of 136 competencies was compiled by Brolin and Thomas (1971). These competencies were prepared for teachers of secondary-level educable mentally retarded children and not specifically for industrial education-special education, but they appear readily adaptable. The three broad headings originally used in the study for categorizing the competencies were Classroom Abilities, Background and Training, and Personal Traits.

After carefully evaluating all available competencies, a comprehensive preliminary list was developed which included 562 competencies. These were derived essentially from the works of Cotrell and others (1970), Melby and Regal (1972) and Brolin and Thomas (1971).

Analysis and Classification of Competencies to Fit NASDTEC Format

Since the preliminary list of 562 competencies was obtained from three major but different sources, the content was often repetitious and the style inconsistent. There was, however, some similarity in the classifications of these competencies into various categories. Therefore, a jury of experts consisting of faculty members and graduate assistants from both the Division of Industrial Education and Technology and the Department of Special Education were charged with the responsibility of individually evaluating and classifying each competency under one of the following eight categories: 1. program development, 2. instruction, 3. knowledge of the learner, 4. community resources, 5. professional role and development, 6. management, 7. personality development, and 8. guidance.

Working from the individual tally sheets, a master tally of all responses was made. This master tally indicated some disagreement among jury members on the classification of certain competencies. Through a series of meetings, the jury eliminated certain inappropriate competencies and ultimately agreed upon the classification of all competencies to be used.

With all competencies categorized, the final step in this preliminary screening process was to eliminate all duplication of ideas, rewrite others in more appropriate forms, and edit to provide consistency in style. This phase was accomplished through three teams, each consisting of one special education and one industrial education faculty member. The final list of 330 competencies which was agreed upon by these evaluation and editing teams was now ready for adoption to the NASDTEC standards format.

In order to establish a performance-based curriculum model which might be flexible and adaptable by many teacher institutions, those competencies deemed essential for the beginning teacher of industrial education who will work with handicapped and disadvantaged youth must be applied to a universally acceptable set of standards. The Standards for State Approval of Teacher Education, 1971, of the National Association of State Directors of Teacher Education and Certification divide the baccalaureate curriculum into three major categories: 1. General Education, 2. Professional Education, and 3. Major Field of Specialization.

Each of the 330 competencies previously developed fit in the NASDTEC category of Professional Education. For greater clarification of the content within the Professional Education category of NASDTEC standards, the New Jersey Supplement delineates eight sub-categories which were paired into the following four groups: 1. Curriculum and Methods of Teaching, 2. Educational Psychology and Human and Intercultural Relations, 3. Foundations of Education and Student Personnel Services, and 4. Field Experiences and Student Teaching. The teams evaluated each of the 330 competencies and classified them appropriately under these eight sub-categories. Some competencies were suited to more than one sub-category and were so listed.

Developing Learning Experiences to Achieve Selected Competencies

The last major steps in developing the performance-based curriculum model was to generate suggested learning experiences through which each competency could be attained by the prospective teacher. Four teams of qualified personnel were engaged to develop this last phase of the model. Again, each team consisted of one faculty member from Industrial Education and one from Special Education. Each team was assigned to one of the four groups described above and was charged with the development of learning experiences for their assigned group of two sub-categories. Each team was supplied with detailed directions for fulfilling their assignment. Briefly, their charge was to: 1. standardize the format and style for each competency in its final written form, 2. eliminate repetitious content in competencies and rewrite or create appropriate new statements, but to retain content as suggested in all assigned competencies, 3. cluster competencies within appropriate content areas under each of the two sub-categories, 4. list in topical outline form, to the first order, the suggested content to achieve the competencies as clustered in (3) above, and, 5. to describe suggested strategies for implementing the content in (4) above.

While these four teams were engaged in developing learning experiences, the authors generated competencies and suggested strategies by which these competencies could be attained for the other two major categories outlined by the NASDTEC Standards. These included the categories of General Education and Major Fields of Specialization. The authors were guided by excerpts from the NASDTEC Standards and New Jersey Supplement when developing details for these two categories.

CURRICULUM MODEL

As stated previously, the central purpose of this project was to develop a curriculum model designed to prepare teachers of industrial education with the special expertise to teach handicapped and disadvantaged children. Implementation of this curriculum model at the baccalaureate level could result in certification in both the fields of industrial education and special education.

This curriculum model is competency-based and in no way attempted to describe a curriculum in terms of specific courses. The intention was to provide the ingredients which each institution could package to best fit their particular needs. To best facilitate this flexibility, the Standard for State Approval of Teacher Education of the National Association of State Directors of Teacher Education and Certification was chosen as the basic structure around which to build the curriculum model. This Standard, consisting of the three major categories of General Education, Professional Education, and Major Fields of Specialization, was chosen because of its widespread acceptance. Each of these three categories was treated separately and are described in the following sections.

General Education

This category of the curriculum encompasses that portion of the baccalaureate program which provides a spread of educational opportunities commonly known as general education. The Standards specify that this category must include studies in at least four of the following areas: humanities, mathematics, biological and physical sciences, and the social and behavioral sciences. The achievement of the competencies listed below should satisfy the requirements of this major category.

COMPETENCIES:

1. The prospective teacher will be able to communicate clearly and effectively through the written word and orally.
2. The prospective teacher will possess a knowledge of the history and culture of his country and state as it relates to the social, political, economic, and industrial aspects.
3. The prospective teacher will possess a basic understanding of the mental, emotional, social, and physical development from childhood through adolescence for both normal and abnormal youth.
4. The prospective teacher will understand the principles of the biological and physical sciences as they relate to man and his environment.
5. The prospective teacher will demonstrate the ability to utilize mathematical concepts as they relate to problems in industrial education and business and social problems.
6. The prospective teacher will be knowledgeable about contemporary health problems and demonstrate the ability to promote safe practices and apply first aid within the school environment.
7. The prospective teacher will possess an understanding of principles of good design and their application to the construction and manufacture of industrial products and the utilization of graphic arts equipment and materials as they relate to communications media.

8. The prospective teacher will possess an understanding of the general development of civilization and many of humanity's fundamental questions through the study of the classics in religion, philosophy, and literature.

Professional Education

This category encompasses the many professional competencies needed by the prospective teacher. The New Jersey Supplement to the Standards specifies that the subcategories of methods of teaching, educational psychology, field experiences, human and intercultural relations, curriculum, foundations of education, student personnel services, and student teaching be included in the curriculum. Each of the sub-categories, with the exception of field experiences and student teaching, is divided into major content areas with appropriate competencies. The sub-categories of field experiences and student teaching are primarily strategies for reinforcing, solidifying, and demonstrating attainment of the competencies specified in all categories of the curriculum. The detailed content of the eight subcategories follow:

I. CURRICULUM

A. Needs Assessment

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Obtain administrative approval for conducting an industrial education survey.
2. Consult the Chamber of Commerce to identify area employers to be contacted in an industrial education survey.
3. Establish communication with employer representatives who will be involved in an industrial education survey.
4. Persuade labor representatives to participate in an industrial education survey.
5. Solicit assistance of the industrial education personnel from the state department and/or university in conducting an industrial education survey.
6. Identify the geographical area in which an industrial education survey will be conducted.
7. Organize a steering committee to assist in the pre-planning activities for an industrial education survey.
8. Devise a plan of activities for the survey staff to follow in conducting an industrial education survey.
9. Collect student occupational interest data to identify vocational needs.
10. Analyze occupations with assistance of employers and labor representatives.
11. Conduct opinion surveys in the school and community concerning the industrial education programs.
12. Determine the availability of occupational opportunities in and around the community.
13. Obtain information on occupational opportunities.
14. Acquire information from members of the community power structure (e.g., political, social, economic pressure groups) regarding their expectations of the industrial education program.
15. Adapt an existing industrial education survey form to local needs.
16. Study community voting results on financial issues affecting the industrial education programs to determine community support of the program.
17. Establish the criteria for selection of advisory committee members.
18. Know how to obtain administrative approval for organizing and selecting an advisory committee.
19. Invite resource persons who can provide consultation service to attend advisory committee meetings.
20. Identify the role and function of advisory committees.
21. Plan the annual agenda to be considered by advisory committees.
22. Consult the advisory committees in planning an analysis of an occupation.
23. Determine the occupations for which training is to be offered in industrial education programs.
24. Consult advisory committees to obtain information concerning their expectations of industrial education programs.
25. Consult advisory committees in developing long-range program plans for industrial education.
26. Obtain from the advisory committees information on ways to improve related instruction and on-the-job training.
27. Provide for group decisions, or recommendations, on proposed programs.

B. Establishing Over-all Aims:

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Plan the over-all objectives and curricula for the total school program.
2. Suggest an industrial education program based on analysis of the vocational education survey.
3. Show knowledge of the reference materials and literature related to reaching the exceptional student.
4. Develop processes for overcoming obstacles to building a good program.
5. Know the provisions made for the maladjusted or handicapped under existing local, state, and federal law.
6. Set up a program within existing employment laws.
7. Specify the long-range facility, equipment, and supply needs for the industrial education program.
8. Prepare and analyze the long-range program, purpose and objectives, for industrial education in the school.
9. Prepare a long-range budget which identifies the financial needs of the industrial education program.
10. Prepare a capital outlay budget proposal for new equipment needed in an industrial course.
11. Prepare a budget for estimated travel expenses incurred in industrial activities.
12. Develop industrial courses by clustering and sequencing related tasks.
13. Assist in writing general objectives for courses offered in the industrial education program.
14. Write student performance goals for the industrial education courses.

C. Task Analysis Technique for Content Selection

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Identify personal, social, and academic competencies required for the performance of each occupational task included in a course.
2. Organize instructional sequences in content areas, in reading, mathematics, language.
3. Analyze an instructional task into component parts.
4. Describe the occupational standards of performance for each task in an occupation.
5. Sequence a series of tasks from simple to complex.
6. Sequence performance goals (objectives) for a course.
7. Write performance objectives in each of the domains of industrial objectives (cognitive, affective, psycho-motor.)

D. Unit Planning

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Involve students in planning a unit.
2. Correlate unit content with on-the-job and/or laboratory experiences.
3. Write content outline for a unit of instruction.
4. Identify the unit topics for a course.
5. Determine objectives for a unit.
6. Select methods of evaluating students' performance throughout a unit.
7. Plan a variety of vocational experiences at both observation and involvement levels.
8. Plan for step-by-step development of social controls.
9. Plan for participation of pupils in setting standards of conduct.
10. Provide real-life experiences in daily living.
11. Develop, employ, and analyze reinforcement contingencies.
12. Plan esthetic experiences as part of units.
13. Plan a program for developing good study habits.
14. Plan for the development of individual pupil interests.
15. Relate the instruction of health habits to real-life situations.
16. Plan individualized instruction according to ability of students.
17. Organize and select individualized program instruction for each student.
18. Plan field trips.

E. Lesson Planning

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Write a lesson plan that identifies specific outcomes, designates methods and media, and provides for evaluation.
2. Write behavioral objectives for all assignments.

3. Prepare instructional materials (both hard and soft copy) using a variety of reproduction techniques.
4. Develop alternative modes for repetition of content.
5. Develop remedial techniques that will reinforce the lesson content for students who need additional help.

F. Evaluation

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Evaluate periodically one's educational philosophy in relation to that held by a majority of other members of the teaching profession.
2. Expand instruction for students on the basis of information obtained from employers on new technology.
3. Review supervisory evaluation reports for assessing the industrial education programs.
4. Assess the adequacy of the industrial education facilities and equipment relative to technological changes.
5. Design evaluation techniques that incorporate a variety of types of performance.
6. Analyze enrollment trends to determine student and parent acceptance of the industrial education programs.
7. Assess the relevancy of the industrial education course offerings.
8. Assess the safety provisions of the facilities and equipment of training stations.
9. Assess educational adequacy of the training stations' facilities and equipment.
10. Formulate procedures which provide for students' participation in the evaluation of instruction.
11. Establish criteria for selection of students.
12. Review student performance goals developed for the program plan.
13. Develop a grading system for performance for related instruction, laboratory instruction, and/or on-the-job instruction.
14. Design a student self-evaluation instrument.

G. Administrative Functions

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Supply administrators with data for industrial education reports required by the state department of education.
2. Obtain reimbursement for the student for allowable training costs such as clothing and tools.
3. Establish a policy for use of the physical facilities by outside groups and other school personnel.
4. Develop communication strategies to explain and promote industrial education in the school and community.
5. Prepare total budget for operation of an industrial education program.
6. Plan in-service programs for teachers.

H. Co-Curricular Activities

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Assist students in advancing within the available degrees in the student vocational organization.
2. Organize a student committee to assess the interest of students in joining student vocational organizations.
3. Plan ways to involve students in clubs, organizations, special events, and course-related activities.

I. Work-Study Internship

Competencies:

The following competencies should be developed in a structured intern program where the prospective teacher works directly with a certified cooperative education coordinator. The prospective teacher will work as an assistant to the coordinator and become directly involved in the following. Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Identify prospective cooperating employers to provide on-the-job training stations.
2. Convince an employer to provide a training station for cooperative education.
3. Assist the cooperating employer in verifying the legality of employing a student-learner in a hazardous occupation.

4. Assist the cooperating employer's personnel in accepting the training status and role of the student-learner.
5. Arrange with a union to make contract provision for student-learners.
6. Establish criteria to evaluate qualifications of prospective on-the-job instructors.
7. Develop a cooperative training agreement between student-learner, parent, school, and cooperating employer.
8. Describe the procedure for a cooperating employer to use in acquiring a federal permit to pay a training wage.
9. Determine federal and state wage and hour classification of the prospective cooperating employer.
10. Obtain reimbursement for the cooperating employer providing on-the-job training.
11. Develop criteria to approve on-the-job training hours and wages for student-learners.
12. Obtain suggestions from the on-the-job instruction to guide the selection of related class instruction.
13. Develop a systematic training plan with the on-the-job instructor.
14. Encourage the on-the-job instructor to follow the progression of experiences for the student-learner outlined in the training program.
15. Assist the on-the-job instructor with development of teaching techniques during visits to the training stations.
16. Conduct termination procedures for on-the-job training for the student-learner when conditions demand it and at the close of a training program.
17. Inform the administration of daily coordination itinerary.
18. Maintain liaison with employment agencies and the community.
19. Develop plan for a training workshop to assist on-the-job instructors in techniques for teaching student-learners.
20. Keep up to date with trends and skills in the selected field of study.
21. Develop positive attitudes toward employment, school and the role of the training instructor.
22. Develop acceptable work habits.
23. Maintain knowledge of current programs available in vocational education.

II. METHODS OF TEACHING

A. Knowledge of Teaching-Learning Problems Specific to the Handicapped

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Describe relationship between mental ability and educational independence of the individual.
2. Know the degree to which mental/physical handicaps affect academic and social learning.
3. Indicate open-ended opinion of the learning abilities of the handicapped.
4. Describe the current instructional practices and techniques for the handicapped.
5. Match a student-learner's unique characteristics with an appropriate learning program.
6. Know materials available for specific instructional situations.
7. Use instructional hardware; i.e., T.V., projectors, fixed machines.
8. Develop teacher-made materials for specific instructional situations.
9. Know the scope and sequence of fundamental skills in mathematics and reading.

B. Managing the Learning Environment

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Identify new tools and equipment needed in an industrial education course for the academic year.
2. Compile a list of supplies needed for the academic year.
3. Plan an operating budget proposal for consumable supplies, services, and materials needed in an industrial education course.
4. Design a procedure for acquiring the consumable supplies and materials needed in an industrial education course.
5. Prepare purchase requests for approved industrial education equipment and supplies.
6. Prepare purchase requests for book and non-book instructional materials.
7. Prepare a five-day schedule including individual, small-group, and large-group instructional time segments.
8. Schedule laboratory equipment for maximum utilization by students.
9. Arrange simulated school and work schedules with student-learners, faculty, and training station personnel.

10. Develop a system to control the transfer of student-learners within the cooperative program and to other school programs.
11. Plan the organization of facilities, materials, and services needed for individual and small-group instruction.
12. Arrange layout of the laboratory to simulate occupational environment.
13. Plan placement of a variety of leisure activities during the school day.
14. Simulate placement of consumable supplies for instructional purposes.
15. Arrange the laboratory work areas and storage space to facilitate student work performance.
16. Plan for proper physical conditions in the classroom and laboratories.
17. Plan instructional sequences in laboratory safety.
18. Know about approved safety apparel and devices for industrial education students assigned to hazardous equipment.
19. Establish a procedure for attending first aid needs of industrial education students.
20. Develop a plan for involving students in cleaning and maintaining the laboratory and classroom.
21. Establish a system for repairing and servicing tools and equipment in the laboratory.
22. Develop student "check out" procedures for tools, supplies, and equipment used in the laboratory.
23. Devise a system for determining and collecting student fees for consumable supplies.
24. Keep simulated records of pupil attendance, behavior, and achievement.
25. Use a variety of student's progress record forms for on-the-job training and related instruction.
26. Develop simulated records of individual work hours, wages, and work progression of on-the-job training.
27. Re-cycle student progress through the use of example operation and/or job sheets.
28. Structure a filing system for records, report forms, and instructional materials used in an industrial education course.
29. Provide an example record of safety instruction presented in compliance with safety laws and regulations.
30. Develop a simulated inventory system for industrial education tools, supplies, and equipment assigned to the laboratory.

C. Active Instruction

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Plan a drill-mastery hierarchy for basic skills.
2. Plan example lessons in which Structure or Divergency is reinforced in the learner.
3. Relate the instruction of basic academic skills to real-life situations.
4. Relate the instruction of basic social skills to real-life situations.
5. Be able to group children on a variety of parameters.
6. Adapt follow-up activities from a group presentation to individual skills within the group.
7. Propose specific action for resolution of learning/behavior problems.
8. Develop Behavior Modification schedules for academic and industrial education learning experiences.
9. Set up specific plan for parent/volunteer tutoring in problem areas.
10. Demonstrate skill in using the basic communication model.
11. Modify directions according to language comprehension ability of student-learners.
12. Communicate specific requirements to student.
13. Use a variety of techniques for presenting instructional content, including programmed instruction, case studies, symposia, student involvement, problem solving, lecture, demonstration, simulation, independent study, and various A.V. media.
14. Establish frames of reference to enable the students to understand a situation from several points of view.
15. Employ oral questioning techniques.
16. Reward pupil growth other than mastery.
17. Demonstrate knowledge of techniques for maintaining classroom discipline.
18. Describe techniques of relating to individuals in groups.
19. Move among pupils and confer individually.
20. Avoid identical, stereotyped demands on maladjusted pupils.
21. Provide alternatives to frustration behavior.
22. Recognize and acknowledge student non-verbal cues.
23. Apply non-verbal techniques (gestures, facial expressions, silence, etc.) to enhance communications.

24. Establish limits firmly and consistently.
25. Be able to cope with students' psychic needs.
26. Demonstrate restraint under verbal and physical attack.
27. Point out pupil errors in solution-oriented fashion.
28. Use humor with a relaxed inoffensive effect.
29. Accept and/or clarify pupil statements in a positive or neutral fashion.
30. Formulate with students acceptable standards of behavior in laboratories.
31. Develop techniques for classroom interaction.
32. Plan methods of giving attention to individual questions or requests for help.
33. Diagnose learning deficiencies using immediate observation.
34. Assess student gains independently by using pre-post testing techniques.
35. Evaluate students' products according to performance standards of the occupations.
36. Use various techniques for describing behavior.
37. Construct tests based on pre-planned content and outcomes.
38. Assess occupational experience reports with the student to plan future instruction.
39. Review student progress and/or achievement records to assess effectiveness of instruction.
40. Interpret students' evaluation of instruction.
41. Modify teaching strategy or techniques based on knowledge of effectiveness.

D. Adjunctive Involvement

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Demonstrate flexibility and ingenuity.
2. Encourage students to discuss career aspirations.
3. Experiment with alternative and/or innovative techniques.
4. Develop high motivation in students towards achieving goals.
5. Demonstrate a regard for and an interest in students as individuals.
6. Obtain approval from the school administration for establishing the student industrial education organization.
7. Organize a student committee to assess the interest of students in joining the student industrial education organization.
8. Plan for, implement, and supervise activities for a student industrial education organization.
9. Participate in non-instructional school duties; i.e., cafeteria, homeroom, bus duty, chaperoning, PTA.
10. Contact state department personnel regarding the steps to be followed in organizing the student industrial education organization.
11. Plan the school-community relations activities for the industrial education program.
12. Recommend reference books and periodicals related to industrial education that should be added to the library.
13. Accept gifts or donations of supplies and equipment for the industrial education program in accordance with school policy.

III. EDUCATIONAL PSYCHOLOGY

A. Learning Theories

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Conceptualize various theories of learning.
2. Use principles of operant conditioning.
3. Exhibit a knowledge of students based on learning theory.

B. Educational Measurement

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Interpret students' evaluation of instruction.
2. Select, administer, and educationally interpret the results of standardized diagnostic and achievement tests.

C. Human Growth and Development

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Identify strengths and weaknesses of the student.
2. Identify the elements of both normal and abnormal growth and development at various age levels.

3. Match a student's unique characteristics with an appropriate training station.
4. Formulate with students acceptable standards of behavior in laboratories; and maintain those standards.
5. Evaluate the student's personal traits and behavior characteristics on the job.

IV. HUMAN AND INTERCULTURAL RELATIONS

A. Educational Relations

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Maintain working relationships with the school supporting staff through cooperation and mutual effort.
2. Maintain good relations with other schools.
3. Involve an advisory committee in conducting an industrial education survey.
4. Assist teachers who are new in the system to understand the policies and regulations of the school.
5. Develop a personal philosophy about "how man relates to his environment."
6. Demonstrate restraint under verbal and physical attack.
7. Recruit teachers and guidance counselors to participate in conducting an industrial education survey.
8. Serve as the liaison for an advisory committee and the school administration.
9. Assist in the development of policies regarding school-community relations.
10. Orient the advisory committee members to their role and function.
11. Conduct opinion surveys in the school and community concerning the industrial program.
12. Use the advisory committee to help to improve related instruction and on-the-job training.
13. Use the advisory committee for information concerning their expectations of the industrial program.
14. Devise a plan of activities for a survey staff to follow in conducting an industrial education survey.
15. Use the advisory committee to help plan an analysis of an occupation.
16. Organize a steering committee to assist in the pre-planning activities of an industrial education survey.
17. Establish criteria for evaluating training station of an employer.
18. State opposing points of view objectively.
19. Identify the role and function of the advisory committee.
20. Plan the annual agenda to be considered by the advisory committee.
21. Use the advisory committee for help in developing a long-range program plan for industrial education.
22. Invite resource persons who can provide consultation service to attend the advisory committee meetings.
23. Identify and use a variety of community agencies and resources.

B. Political Relations

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Work with a team of professionals from the school and/or community on pertinent school problems.
2. Maintain liaison with state department personnel.
3. Persuade labor representatives to participate in an industrial education survey.
4. Arrange with a union to make contract provision for students.
5. Maintain liaison with union officials and employers.
6. Solicit assistance of the vocational education personnel from the state department in conducting an industrial education survey.
7. Consult the Chamber of Commerce to identify area employers to be contacted in an industrial education survey.
8. Obtain administrative approval for organizing and selecting the advisory committee.
9. Contact state department personnel regarding the steps to be followed in organizing a student organization.

C. Economic Relations

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Maintain good working relationships with the training station personnel.
2. Provide consultant services to local business and industry.

3. Establish communications with employer representatives who will be involved in an industrial education survey.
4. Assist the cooperating employer's personnel in accepting the training status and role of the student.
5. Convince an employer to provide a training station for industrial education.
6. Identify prospective cooperating employers to provide on-the-job training stations.
7. Analyze occupations with assistance of employers and labor representatives.

D. Ethnic Relations

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Acquire information from members of the community power structure (e.g., political, social, economic pressure groups) regarding their expectations of the industrial education programs.
2. Maintain liaison with community professional, service, fraternal, social, and religious organizations.
3. Determine and understand cross-cultural values.
4. Serve community needs by contributing professional expertise to civic projects.
5. Demonstrate empathy for students.
6. Demonstrate techniques of introspection; e.g., sensitivity training, etc.

E. General Public Relations

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Present activities of the industrial education program by mass media.
2. Publicize the purpose and objectives of an industrial education survey.
3. Represent the teaching profession as a committee member or delegate to meetings and activities of other professions.
4. Publicize the establishment of the advisory committee, its members, and its function to the school and community.
5. Obtain informal feedback on the vocational program through contacts with individuals in the school and community.
6. Provide for group decisions, or recommendations, on proposed programs.
7. Study community voting results on financial issues affecting the industrial education program to determine community support of the program.
8. Plan the school-community relations activities for the industrial education program.
9. Serve in a community, civic, service, or social organization to improve the image of the industrial education program.
10. Speak to school and community groups on the industrial education programs.
11. Provide displays in the school and the community on the industrial education programs.
12. Conduct an open house to familiarize members of the school and community with activities of the industrial education programs.

V. FOUNDATIONS

A. The Study of Socio-Historical Relationships

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Show an awareness of the culture and society of the students.
2. Determine and understand cross-cultural values of students.
3. Develop a personal philosophy about man's relationship to his environment.

B. Personal and Professional Relationships

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Indicate available industrial education programs.
2. Maintain working relationships with the school supporting staff through cooperation and mutual effort.
3. Do more than the position demands.
4. Use a self-analysis form to evaluate one's personal and professional abilities and limitations.
5. Identify current trends of the teaching profession.
6. Maintain ethical standards expected of a professional educator.
7. Promote the attainment of the goals and objectives of the teaching profession.
8. State opposing points of view objectively.
9. Assume responsibilities in a professional manner.

10. Use other resources in the school environment.
11. Devote extra time for improvement of instruction.
12. Maintain professional certification through enrolling in graduate, extension, and in-service education programs.
13. Expand educational background and leadership potential by achieving advanced degrees.

C. Philosophical Relationship

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Express a philosophy compatible with that of the industrial education staff.
2. Evaluate periodically one's educational philosophy in relation to that held by a majority of other members of the teaching profession.
3. Express a philosophy compatible with the objectives of industrial education.
4. Express a philosophy relevant to the basic goals of the teaching profession.
5. State a personal philosophy about theories related to learning.
6. State a philosophical position which is in keeping with one's personal and professional abilities and limitations.

VI. STUDENT PERSONNEL SERVICES

A. Principles and Theories of Counseling

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Demonstrate a knowledge of the purposes, services, and locations of national organizations concerned with the education or general welfare of exceptional individuals.
2. Conduct group counseling sessions.
3. Counsel students.
4. Demonstrate an ability to counsel parents.
5. Confer with students and parents at home and in school, regarding the student's educational development.
6. Supply the guidance counselor with performance data about students.
7. Communicate curriculum goals to parents.
8. Communicate with prospective and continuing students during the summer.
9. Use other resources in the school environment.
10. Understand limitations of the handicapped and disadvantaged students.
11. Demonstrate empathy and understanding for parents of the handicapped and disadvantaged students.

B. Career Guidance

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Devise a system for maintaining occupational information and opportunity data for use by students.
2. Direct student presentations describing activities of the industrial education program.
3. Assist the student in the solution of problems related to starting and continuing on-the-job training.
4. Conduct termination procedures for on-the-job training for the student when conditions demand it and at the close of a training program.
5. Refer students to qualified personnel agencies for occupational and educational information.
6. Assist students in securing and in filling out applications for jobs, scholarships, educational loans, or college admission.
7. Demonstrate efficient methods of occupational placement and post-school follow-up.
8. State methods for encouraging students to discuss career aspirations.
9. Assist graduates or seniors in preparing for interviews with potential employers.
10. State methods for developing student-parent activities for industrial education programs.
11. Write letters of recommendation for students.
12. Provide information and resources to students on post-high school opportunities available to them.
13. Assist students in determining ways to best describe their salable skills.
14. Acquaint prospective students and their parents with the purposes, activities, and values of the student industrial education organizations.
15. Devise a system for maintaining occupational information and opportunity data for use by students.

C. Evaluation and Diagnostic Techniques

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Select, administer, and educationally interpret the results of standardized diagnostic and achievement tests.
2. Analyze students' cumulative records.
3. Interpret occupational tests and inventories to students.
4. State methods for recognizing needs and goals of individual students.
5. Identify a prospective student on basis of selection criteria and data.
6. Establish criteria for selection of student.
7. Maintain anecdotal records on students.
8. Determine relationships among students through sociometric techniques.
9. Evaluate work competencies.
10. Determine the reasons students drop out of the programs.
11. Interview students and parents to obtain student interest and aptitude information.
12. Recognize potential problems of students.
13. Arrange for the local office of the U. S. Employment Service to administer and to interpret the General Aptitude Test Battery.
14. Evaluate the quality of the on-the-job training received by the student.
15. Obtain information from parents relative to their expectations of the programs.
16. Examine the student's progress records to determine future on-the-job training experience and related classroom assignments.
17. Administer subject matter diagnostic tests.
18. Analyze enrollment trends to determine student and parent acceptance of the program.
19. Provide parents with systematic and comprehensible evaluations of student progress.
20. Evaluate student's personal traits and characteristics on the job.
21. Administer occupational tests relative to student selection and placement.

D. Resources and Techniques for Remediation

Competencies:

Upon completing the proposed curriculum, the prospective teacher will be able to:

1. Work with other teachers to help students with individual problems.
2. Assist students with their problems by working cooperatively with agencies such as the health and welfare services.
3. Assist parents in obtaining information from clinics, organizations, and agencies.
4. Propose specific action for resolution of learning and behavior problems.
5. Refer students to the guidance counselor and other specialists within and outside of the school.
6. Develop remedial techniques.

VII. & VIII. FIELD EXPERIENCES AND STUDENT TEACHING

Field experiences refer to all those activities, outside the classroom, which take place prior to full-time student teaching. Student teaching is the culminating field experience which refers to full-time responsible teaching under the supervision of a master teacher. While Field Experiences include only those individual or group activities taking place outside of the formal college classroom, the introductory and summary phases of these experiences will many times be held in the college classroom and be a major part of the planning for the total experience.

No attempt has been made to identify when in the program sequence the field experience will occur. The general direction is from limited observation through closely-controlled participation to concluding experiences where the student has a major responsibility for instructional decision-making (planning) and program implementation.

The Field Experiences are considered to be a series of aids to learning ranging from limited observation to responsible teaching. They are methods rather than content. The procedures explained below were followed in the development of the sub-categories of Field Experiences and Student Teaching.

Content and strategies included in the other sub-categories of Professional Education were examined. From this examination, the following sequence of Field Experiences was developed.

1. Observation primarily in-class within public and private educational agencies. Major purpose—introduction to programs and children.

2. Observation in industrial or other work-related environments. Major purpose—introduction to work environments.
3. Broad community observation—urban and suburban.
4. Limited participation in-class with public and private education agencies. Activities include serving as teacher' aides and/or working with individual or small groups of children.
5. In-depth participation (practicum) in-class with public and private educational agencies—four experiences should include:
   a. traditional classroom — normal children
   b. traditional program of industrial education
   c. traditional special education program
   d. special education program with industrial education emphasis
   Within this experience (#5) will be included observation of educational service functions (administration, health, guidance, instructional media offices) and school board meetings.
6. In-depth participation with community agencies (other than schools).
7. Full-time teaching — beginning with initial observations through various stages of participation to full responsibility as a teacher — two experiences should include:
   a. one experience in either special education or industrial education, depending upon choice of specialization
   b. one experience in industrial education for handicapped and disadvantaged children
   A college seminar should be incorporated in the program at the time of full-time teaching.

Major Fields of Specialization

In order to meet the certification requirements for both industrial education and special education, the prospective teacher will need to achieve the competencies prescribed for either industrial arts or vocational education and the competencies for exceptional children. Again, no attempt has been made to identify specific courses, but rather to enumerate several broadly-stated competencies. This approach permits a particular institution to develop its own teacher training program to achieve the necessary competencies.

Currently, a number of states, including New Jersey, have task forces developing specific competencies for the various fields of specialization. As these competencies are finalized and adopted, they should be used as the basis for curriculum development in the various fields of specialization.

I. INDUSTRIAL ARTS

Competencies:

1. The prospective teacher will be able to teach a general industrial arts course offering instruction in the main divisions of industrial arts subject matter.
2. The prospective teacher will be able to teach a general unit-type laboratory or shop in one of the main divisions of industrial arts subject matter.
3. The prospective teacher will be able to interpret and apply the philosophy, principles, and methods of industrial arts in elementary, secondary, adult, and collegiate schools.
4. The prospective teacher will possess a fundamental knowledge of the historical development of technology and its impact on man and society.
5. The prospective teacher will possess technical competencies in the fields of drafting, electricity-electronics, graphic arts, manufacturing and construction industries, and power and transportation.
6. The prospective teacher will be able to understand industrial problems and to make independent investigations of the origins and evolution of present industrial conditions.
7. The prospective teacher will be able to design, construct, and test individual projects.

II. VOCATIONAL EDUCATION

Competencies:

Rather than list all the competencies required for each occupation, the one broad competency will be:

The prospective teacher will be able to perform all the tasks which would be expected of a journeyman (or similar level of competency) in the occupational area he intends to teach.

III. EXCEPTIONAL CHILDREN

Competencies:

1. The prospective teacher will understand the types of natures of exceptionalities among children and youth and their educational relevance.

2. The prospective teacher will possess competency in individual and group classroom management procedures appropriate to exceptional children.
3. The prospective teacher will demonstrate use of diagnostic procedures to identify the learning difficulties of the exceptional child.
4. The prospective teacher will have the ability to develop and implement prescriptive programs based on diagnostic findings.
5. The prospective teacher will possess knowledge of techniques utilized in behavioral control.
6. The prospective teacher will possess social skills and attitudes to work effectively with other school personnel in coordinated programs for exceptional children.
7. The prospective teacher will have the ability to interpret the educational program to parents, teachers, administrators, and community groups.
8. The prospective teacher will have ample opportunities to observe institutions and facilities concerned with the education, health, and welfare of all types of exceptional children.
9. The prospective teacher will have supervised laboratory experiences with exceptional children as one means of determining the candidate's maturity for work with exceptional children.
10. The prospective teacher will be encouraged to affiliate with appropriate professional groups and create an awareness of the referral agencies available for aid to exceptional children.
11. The prospective teacher will develop competence in planning and conducting wide varieties of learning experiences for individuals and groups.

RECOMMENDATIONS AND SUGGESTIONS FOR IMPLEMENTATION

With the need for industrial education teachers to teach handicapped and disadvantaged youth at the secondary level firmly established and with this curriculum model for the development of teacher training programs now available, it becomes incumbent upon teacher educators to take the initiative to create appropriate pre-service programs.

There is no one best way to approach the development of an appropriate pre-service program. Each institution must utilize its resources in its own unique way. Prevailing conditions, including the nature of presently existing programs in one or more of the areas of specialization under consideration, will have a bearing upon strategies used. The suggestions enumerated in subsequent pages are offered as possible approaches and should not be considered to be in any rank order or to possess any mystical characteristics.

Three categories to be included in a curriculum are General Education, Professional Education, and Specialization which could include either industrial arts, vocational education, or both, and special education. The category of General Education is ordinarily well developed in teacher education programs and will require modification only to insure that experiences which are unique for this new specialist be included. It should include areas of study through which the necessary general education competencies can be attained. Each field of specialization presents its own unique problems. For those who would consider performance-based criteria for the development of their area of specialization, considerable assistance through resource materials should be available in the very near future. Many states are presently enumerating, analyzing, and finalizing competencies considered essential for the beginning teacher in many areas of specialization. As these lists become available and are adopted by institutions, they can serve as the base from which the curriculum is developed.

One approach for an institution to consider which has programs existing independently of one another — for example, special education and industrial arts education — could be as follows: Utilize the competencies suggested in this report in the Professional Education, General Education, and Specialization categories and analyze the outcomes of existing courses in terms of competency attainment. After careful analysis, those competencies which are not provided for in existing courses should be enumerated and may be accounted for in several ways. For example, present courses might be modified by substituting essential material for content and practices no longer appropriate. In some cases, new courses may need to be developed and possibly others eliminated. Many innovations should be considered, such as mini-courses, internships, individualized instruction, and maximum utilization of instructional technology. Internships could be arranged by contract to provide in-depth study in specific areas, industrial observations, and industrial work experience. Where possible, industrial experience should be attained where the handicapped are employed. Internships could be contracted for during the interim, summer, and regular sessions. Individualized instruction could include programmed instruction, micro-teaching, learning centers, and computer-assisted instruction. Field experiences will no doubt need to be altered to provide exposure in each area where certification will be granted. Existing specialized programs such as Sheltered Workshops, Work Experience, Introduction to Vocations, Employment Orientation, Cooperative Industrial Experience, as well as modified programs in vocational schools, industrial arts in secondary schools, and specialized schools for the handicapped and disadvantaged, should be considered for providing these experiences. Whenever possible, an inter-disciplinary approach should be used for field experiences, student teaching, and professional courses related to curriculum, methods, and foundations. Consideration should also be given to the possibility of credit by examination to permit those with adequate background in various areas to test proficiency.

To develop a new dual-purpose program where one area of specialization presently exists, courses for the new area should be developed and integrated with the existing specialization as described above. If the existing program is in special education, the precautions which follow should be considered.

In cases where neither program presently exists or where those existing are not appropriate, a comprehensive curriculum development plan must be initiated. This will require a feasibility study to determine the extent to which a dual certification program could be successfully implemented. The expense of establishing a comprehensive program in industrial education may be prohibitive. Therefore, it may be necessary to consider alternatives in terms of the physical plant requirement. Arrangement for the use of facilities at a nearby community college, a vocational technical school or suitable public or private school may be considered. The development of a new dual-purpose program could permit the use of many innovations where freedom exists from the shackles of tradition, established policy, and restraints from existing physical conditions.

In every case, an organized approach through a systems analysis procedure should be adopted for the development and integration of areas of specialization in a new curriculum. The procedure should make possible valuable input from educators, parents, students, community leaders and organizations, advisory groups, and business and industry. Also inherent in the development of any program must be the provision for evaluation and modification of the programs to insure the attainment of objectives which are realistic educationally as well as geographically.

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TEACHER EDUCATION

New Dimensions in Industrial Arts Teacher Evaluation

Raymond G. Wasdyke

The National Teacher Examinations (NTE) consist of a battery of objective tests that are taken both by undergraduates who are completing their academic preparation for teaching and by teachers in the field. The examinations are designed to aid school systems and teacher education institutions in their efforts to improve the selection and preparation objectively on a national scale. The battery consists of measures of preparation that are common to all teachers (called the Common Examinations) and measures of preparation related to subject-matter content and methodology (called the Teaching Area Examinations).

The Common Examinations consist of two categories of tests – Professional Education and General Education. Included in the professional education test are questions related to the social and cultural forces that influence curriculum and teaching, as well as general principles of learning and instruction. The general education tests include written English expression; social studies; literature and the fine arts; and science and mathematics.

Teaching Area Examinations are offered in a wide variety of areas, one of which is industrial arts education. The examinations are administered nationally four times during the year.

Specifically, the purposes and uses of the industrial arts test of the NTE are as follows:

– To measure competence in the subject-matter the candidate hopes to teach.
– To provide information useful in diagnosing strengths and weaknesses in the candidate's background preparation.
– To serve teacher education institutions in their efforts to improve teacher preparation.
– To provide one type of quantitative information useful in the selection of teachers.

The industrial arts education test is designed to measure the candidate's knowledge of the basic facts, concepts, and principles that relate to the field of industrial arts. In addition, the candidate is tested on his ability to integrate particular aspects of the subject matter with specific teaching situations and problems. The test is geared to candidates who expect to teach industrial arts in classes ranging from grades 7 to 12.

In order to maintain the content of the industrial arts education test current, the test is periodically reviewed by professional industrial arts educators and test development professionals. This past summer the test was reviewed by professional industrial arts educators who represented a wide variety of viewpoints. Those educators who took part in the review included the following:

Test Development Committee
Dr. E. Kabakjian - Executive Secretary of the AIAA
Dr. W. Alexander - Associate Professor, Dept. of Ind. Ed. and Tech., Trenton State College
Dr. J. Streichler - Professor and Chairman, Dept. of Ind. Ed. and Tech., Bowling Green University
Mr. H. Batterman - Ind. Arts Teacher and Chairman, Dept. of Ind. Arts, Oakland, Calif.
Mr. L. Foth - State Specialist in Ind. Arts, Kansas

The content domain for the NTE industrial arts test is based upon industrial technology. In order to select content that was appropriate for inclusion in the industrial arts test, the test development committee established the following set of criteria.

CRITERIA FOR THE SELECTION OF CONTENT APPROPRIATE FOR THE NTE INDUSTRIAL ARTS TEST

1. Is the content consistent with identifiable trends in industrial technology?
2. Is the content consistent with identifiable trends in educational technology?
3. Is the content germane to the day-by-day functions of beginning reachers?

4. Is the content appropriate for entry-level teachers?

5. Is the content exclusive to the field of industrial arts, or is it more appropriate to the Common Examinations?

6. Is the content presentable in multiple choice format?

7. Is the content organized to synthesize educational and industrial technology?

An analysis of the field of industrial technology by the committee resulted in a content outline which represents the current direction of the field of industrial arts and meets the criteria previously stated. Specifically, the content outline is as follows:

NTE - Industrial Arts Test Content Outline

I. Technical Content
   A. Manufacturing
   B. Construction
   C. Communications
   D. Power and Energy
   E. Transportation
   F. Metrology and Material Science
II. Professional Content
   A. Classroom Management
   B. Continuing Education
   C. Philosophy
   Total Number of Questions — 150

The content outline provides a means by which specific test questions can be developed. Each one of the sub-topics listed in the content outline is allocated a specific number of tests. This guarantees that each sub-topic is thoroughly tested. The number of test questions does vary, however, depending upon the complexity and importance of the subject matter.

The content outline or test specification serves as a tool which is used to assign test committee members and other question writers specific topics from which to generate questions. After the questions are written by professionals in the field, they are forwarded to Educational Testing Service for a review by a test developer. Once the test developer has reviewed the questions, the committee meets once again to review all of the questions. During this reviewing process, the committee selects those questions which best reflect the test specifications. Following this procedure, the test is assembled by Educational Testing Service and administered.

Each time the industrial arts test is administered, a statistical item analysis is computed and reported. Since the quality of the test is of particular importance, test developers review the item analysis after each administration to ascertain the statistical properties of each item. The item analysis is also reviewed by the test development committee during their annual meeting to provide statistical as well as content basis for the selection of a particular question for the test.

The development and use of the industrial arts test is based upon a number of theoretical considerations and assumptions. The purpose of the test is to determine whether or not an individual has the cognitive ability to answer specific questions related to industrial arts education. Any further assumptions linking this cognitive ability to performance ability must be viewed with caution. Knowing the recipe for preparing food (the prescribed ingredients, the proper amounts of each, when each is to be introduced into the mixture, and the conditions under which the preparation should take place) does not assure the success of the finished product. This does not mean that cognitive ability is unimportant, but the implication is that to use this ability as the sole predicator of teaching effectiveness or ability is unjustifiable. The function of a cognitive ability test is to supply data on one point of a measurement continuum where the sum of these points yields a more reliable and valid index than any one point.

With this consideration in mind, let us explore the use of the industrial arts test in the selection process. First of all, let us expand the concept of selection from what it is today, usually a one-shot affair, to a more encompassing concept. The selection process as presented herein extends from recruitment to tenure. The selection process as suggested would consist of such considerations as recruitment, oral interviews, psychological testing, minimum competency testing in cognitive and psychomotor access, microteaching, workshops, and verbal-interaction analysis, to name but a few. Not all of these considerations are concerned with measurement per se, but the point of the matter is that if these and other considerations are taken into account and used as part of the selection process, a more reliable and valid selection program will result.

In summary, the NTE—Industrial Arts Test provides a source for determining an individual's knowledge concerning industrial technology as reflected in industrial arts education. The test is developed by a variety of industrial arts professionals and is continually reviewed in an effort to improve both its content and testing properties. When the test is used as a selection device, it is recommended that it be used as one point on a measurement continuum. Furthermore, it is also recommended that the selection process be viewed on a continuum from recruitment to tenure.

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A New National Industrial Arts Teacher Examination—Impact upon Industrial Arts Teacher Preparation

Michael J. Dyrenfurth

The possibilities and implications of a revised standardized examination in our field are exciting. Industrial arts education specifically, and industrial education in general, has in our view been neglected and passed over by test developers. Of course, many fine efforts have generated individual and specific evaluative devices, but none seem to have the potential of the new industrial arts portion of the National Teachers Examination.

Working from this premise of potential, what are the implications for industrial arts teacher educators? In addressing this question, it is imperative to recognize that the examination, in its revised form, will represent a substantial change over what a large portion of the country thinks industrial arts is all about. Once this is recognized, it becomes apparent that we are again dealing with the dynamics of change in social and professional environments.

We will not attempt to elaborate the topic of change and industrial arts teacher education, for it has already been the subject of much discussion. Instead, a simplified version of Kurt Lewin's force field view of change is adopted in the attempt to illustrate one interpretation of the future of industrial arts teacher education relative to the effects of the industrial arts portion of the NTE.

First, the contention that the industrial arts area examination represents a change must be supported. As we look closely at the examination's specification, we can clearly identify that it represents and solidifies the content thrusts of some major innovative programs. For example, the manufacturing and construction categories and the pre-processing, processing, and post-processing aspects of the IACP are represented. The marketing and distribution portions of the American Industry Project are noted. Some of the VICOED concepts in communication, EPIC (as developed by A. J. Palumbo at Bowling Green State University) concepts in energy, power, instrumentation, and control, as well as materials science concepts are also evidenced by the test specifications. Because of the systematic inclusion of these components, the claim is made that the industrial arts portion of the NTE represents a significant content-base change.

In addition to change in the specific categories of content, the industrial arts area examination also represents a change in the developmental classification. The development of test items was predicated upon a taxonomy that encompassed the various domains of learning. Cognitive, affective, and psychomotor domains and their sub-classifications were systematically used to specify the requirements of test items. Consequently, not only is the content radically different, but the levels and types of knowledge and performance required for success has changed.

Another force for change, related to the implications of the NTE, is the result of the apparent abundant supply of teachers. Formerly, responsible school officials claimed that when a greater supply of teachers became available they would become more selective and choose only the best teachers, thereby improving education. Unfortunately, and perhaps this is due to the present economic situation, the willingness to obtain better teachers does not appear to be very evident. However, it is hoped that this premise is incorrect, because if that desire is present it represents a needed quest for quality that will undoubtedly manifest itself at all levels of the educational system. It could then be extrapolated that this demand will be implemented by using the industrial arts portion of the NTE as a significant component of the teacher selection process. Should this practice be adopted on a wide scale, the potential force for change is tremendous.

Now after having suggested three influences upon change, their effects can be pursued. Using Lewin's model, we can postulate the existence of an educational system being acted upon by many forces. The effects of these forces can be determined by a "vector-like" resolution of their magnitudes and directions.

It is very likely that such forces will be generated by the NTE. For example, if widespread adoption materialized, the phenomenon of "teaching toward the exam" may emerge. Three specific examples of this phenomenon can be cited: the New York State Regent's examinations; the one-time "provincials" administered in Alberta, Canada; and the GRE. In each case, the practice of gearing instruction to the examination has been actually experienced by the reporters. Students have even been urged to buy old copies of the examination or a related handbook of "practice" items. In both cases, these reviews of old examinations were accepted normative procedures, and in no way representative of an attempt to subvert the system. It must also be recognized that the notion of gearing instruction (and learning) towards an examination may be highly desirable. But in this case, the examination had better represent what we as industrial arts teacher educators really want to espouse as desirable goals.

Under these conditions, our model of the force field could then be represented by a simple system with one force acting upon it, this force being the gearing of industrial arts teacher education programs towards the new content. This, however, is not the case, for when closer scrutiny is applied, other forces also become evident. The most obvious of these could be the ETS Cooperative Industrial Arts Tests for junior high school students. The Seventh Mental Measurements Yearbook (Buros, 1972) contains critical reviews of this set of tests. In these, Dr. T.S. Baldwin (University of North Carolina) and Dr. R.A. Swanson (Bowling Green State University) suggest that the content of the student examination is not generally representative of the innovative curriculum projects. Now it is very conceivable that we could have the situation where one force, the NTE, is exerted in one direction (or several if the component factors of content and domain are dealt with separately) and the Cooperative Industrial Arts Tests are pulling in the opposite direction. While the resulting tensions can only be resolved when the relative magnitudes of the forces are determined, it is clear that the situation is not conducive to progress.

Of course, an alternative implication, if in fact the NTE represents acceptable current thought, is that the Cooperative Industrial Arts Test be immediately revised. Furthermore, and many of you have probably experienced the situation, the Cooperative Industrial Arts Test is not the only force that acts on our educational system to oppose the change represented by the NTE industrial arts portion. Public opinion also seems to lag behind what is recommended as desirable practice. The recognition of this force requires another systematic activity to counteract it. A likely possibility is a dynamic public information system.

In summary, what can be suggested about the implications of the Industrial Arts Area Examination on the educational system?

1. First and foremost of the prognostications, especially in the light of the inferred trend, is the recognition of the likely implementation of this examination. Because of this, a great drive among the leaders of industrial arts teacher education must be mounted to assess the instrument and assure its compatibility with, and representativeness of, current educational aspirations.

2. It seems likely that all levels, particularly public secondary and teacher education programs, must recognize the potential impact of the NTE.

3. Teacher education institutions probably will develop curricula consistent with the technical content synthesized by the examination, and they will do it more rapidly as the utilization of the examination is extended.

4. A similar comment applies to the professional education component of industrial arts teacher education programs.

5. Teacher education programs will probably have to develop, transmit, and require

competencies in the areas of public relations and information dissemination.

6. Upon widespread adoption of the NTE, the character of industrial arts programs as practiced in the schools will probably become more consistent with the character of the NTE.

7. It is likely that, as industrial arts teacher educators recognize, and possibly even cause, the content of the IA portion of the NTE to be consistent with their views, they in turn will work toward greater use of the instrument. This, of course, would contribute to the forces supportive of change.

8. Further implications specific to each of your environments and systems can be added in similar manners. Just remember that in order to effect change, the resolution of all the forces on your system must result in a movement towards the intended goal, and this can only happen when every restraining influence is systematically counteracted by another with effects of opposing directions and greater magnitude.

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Industrial Arts Teacher Education Experience in an Urban Setting

John J. Humbert, 3rd

Living in an urban society provides many opportunities for educators to experiment with different and possibly innovative programs in teacher education. The urban-suburban setting of New Jersey provides an excellent opportunity to work with both population concentrations. Most of the students are from either semi-rural or suburban backgrounds. They are not usually aware of the problems that are faced in the urban society and school systems. They tend to fear the unknown. In an attempt to broaden the students' knowledge and background, an effort was made to involve them in an urban setting. The experience was called an Urban Environmental Study.

As part of the professional semester in industrial arts of Glassboro State College, a study was undertaken to expose the student to the urban environment in New Jersey. Arrangements were made with Mr. William Harvey, Coordinator of Industrial Education at the Montgomery Street School in Newark, New Jersey, to spend a week studying the urban environment, its problems and possible solutions, and to work with the industrial arts teachers in the school. The study involved discussions with community leaders, rap sessions with students and parents, seminars with various city departments, and an overview of the functioning of the urban environment.

The 17 industrial arts students who participated in the Newark Urban Environmental experience were from suburban and rural backgrounds. Two members of the group had urban backgrounds or experience. The urban environmental experience was to acquaint the student with the problems faced by the students, parents, and citizens of a large urban center.

The students toured several areas of Newark, which was graphically illustrated by the marked contrasts between different areas of the city. They spent several days in the Montgomery Street School visiting industrial arts classrooms and discussing school-related problems with the staff. Rap sessions were held with model city representatives, community affairs leaders, and several other parent and community groups. These sessions helped the students understand some of the problems and frustrations faced by those living and working in the cities.

The group's reactions varied from somewhat frightened to bored. The first reaction of most of the group was: "It was not as bad as I had thought." As the week progressed, both excitement and depression were evident as the group saw the potential of the situation. Depression and frustration were recognized in the size of the problem and in some of the attitudes of the teachers which the group had contact with. The group could not understand why some teachers just drew their pay and did nothing in the classroom to

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improve the opportunity offered by being involved in the students' growth and development.

The over-all student reaction to the urban environmental experience was very favorable. Several said they would want to teach in such a situation; others said, "Nothing doing." Each said that the experience was broadening and of value to them, as they had a better understanding of the problems faced by education in the large urban centers.

One very important point is that the cooperation of Newark School System, the Montgomery Street School, and their Principal, Mrs. Dorothy Gould, could not have been better. It was the feeling of the students and the professor that the entire school system and city did an excellent job in all aspects of the urban environmental experience. If anyone is interested in working with other urban systems, the cooperation would be just as excellent.

This urban environmental experience is just one of several that are planned or have been undertaken by Glassboro State College's Industrial Education Department. We believe that these experiences are a valuable part of a professional teacher's development.

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Internships and Externships: An Approach to Urban Teacher Preparation

Leslie H. Cochran

Harold S. Resnick

The urban school systems with high concentrations of low socioeconomic students have been designated as the priority area for American education. During the last decade, millions were authorized and appropriated to provide new materials, modern equipment, auxiliary personnel, and pre- and post-school programs. In a review of these expenditures, however, it is hardly surprising that they have done little to solve the deep-seated and complicated problems of the inner-city schools. What is even more alarming is the distressing fact that after several years of widespread public and professional interest in the education of the disadvantaged, most urban school systems are not succeeding in reversing the long-term decay that has culminated in disastrously inadequate programs.

Numerous proposals and models in industrial education have been developed in an attempt to alleviate the situation. Typical among these are the Occupational, Vocational, and Technical Program in Pittsburgh; the Galaxy Plan in Detroit; the Correlated Curriculum Project in New York City; and Training for Families of Skills in Quincy, Massachusetts. While these and other programs have gained varying levels of success, their influence, for the most part, has been localized to the immediate areas. Even the most successful have been plagued by such system-wide problems as finance, control, segregation, and teacher restraining. Little leadership has been forthcoming at the state level. For example, the Michigan State Curriculum Committee on Holding Power recommended changes in four major areas:

1) Changes in Program
    - Improving the instructional program
    - Providing part-time employment
    - Improving the extra-curricular program
    - Providing experimental classes for potential drop-outs

2) Changes in Pupil Personnel Practices
    - Providing occupational information
    - Assisting with educational choices
    - Identifying potential drop-outs early
    - Providing exit interviews for drop-outs
    - Providing follow-up contacts with drop-outs
    - Making local drop-out studies
    - Improving school records and reports
    - Providing teacher workshops on keeping students in school

3) Changes in Administrative Procedures
    - Reducing size of classes
    - Improving transportation facilities
    - Providing time for teacher conferences with potential drop-outs
    - Using case conference approach to hold potential drop-outs

4) Changes in Ways of Working with Parents and Community
    - Co-operating in community educational, social, and recreational programs
    - Taking initiative in obtaining co-operation of parents and others in working with potential drop-outs
    - Working with local business, industry, armed services, and higher educational institutions to encourage students to stay in school
    - Establishing job up-grading programs in the community

While these are helpful guides, little change has occurred.

Despair over inability to correct the serious dysfunctions which permeate the urban schools has resulted in expressed doubt that the public schools are capable of undertaking the profound reforms which would enable them to provide adequate educational programs. As a result, attempts have been made to:

1) Develop a competing network of nonpublic schools which might be less resistant to change.

2) Develop "high schools without walls" to provide wider options.

3) Hire ombudsmen to investigate complaints.

4) Establish specialized schools and skill centers to more appropriately serve the needs.

These and other suggestions provide new alternatives. They can by no means, however, be viewed independently of teacher preparation. While not a panacea, teacher preparation is a key ingredient in the reformation of urban education programs. For industrial education teacher preparation, it means starting with a totally new orientation. Some gains have been made in adapting existing programs to a more "urban orientation"; but, for the most part, little progress has been made. In-service experiences are far from encouraging and at the best only serve as stop-gap measures.

The needs of industrial education teachers in this setting are many and varied. While some of these parallel qualities can be demonstrated in any learning environment, the urban setting places special emphasis on certain characteristics. Furthermore, it requires a blending and integration of traditional teacher preparation with the practical "living environment." The luxury of theory (university) and then practice (student teaching and employment) can no longer be accepted in dealing with the urban school. This need is further illustrated in the 1970 American Council on Industrial Arts Teacher Education Yearbook, which calls for "vast changes" in the way in which industrial arts teachers are prepared. Two key elements in the reorientation are the internship and the externship. Before example programs incorporating these two approaches are described, focus must be placed on guiding elements that must be inherent in such a program.

Guides for the Industrial Urban Teacher

Numerous guides could be presented for the industrial education teacher in the urban setting; however, the ten listed below deserve special consideration.

1) The industrial education teacher must demonstrate specific professional and technical competencies.

2) The industrial education teacher must be flexible and be able to adapt to a variety of personal, social, and academic situations.

3) The industrial education teacher must be extremely capable of dealing with individuals.

4) The industrial education teacher must thoroughly understand the community, values, and goals of the urban youth.

5) The industrial education teacher must possess a wide variety of teaching strategies and know the appropriateness of each.

6) The industrial education teacher must demonstrate humanistic characteristics and reveal an interest in the students.

7) The industrial education teacher must be willing and able to work under less than ideal situations while striving to improve the program.

8) The industrial education teacher must have a broad understanding of the industry and be able to reflect it in the program.

9) The industrial education teacher must utilize the total resources of the community to build a total industrially-related program.

10) The industrial education teacher must be willing to work for students and to support their best interest rather than placing them second to pure academic needs or administrative convenience.

INTERNSHIP

Two innovative approaches to prepare industrial arts teachers for an urban environment are in operation at Temple University. Both are designed to provide teaching candidates with the attributes stated above. They are concerned, however, with different clientele and utilize different approaches to achieve the desired goals.

The internship program is designed for an individual who has a baccalaureate degree in ar area other than industrial arts and is employed by a school system without appropriate certification. This program combines undergraduate certification requirements with a Master of Education degree. The only population this program is designed to serve consists of individuals employed by the Philadelphia public schools or surrounding districts who have baccalaureate degrees in non-education areas and who need to meet certification requirements. Their employment is a factor of the continued shortage of qualified industrial arts teachers both in the Philadelphia metropolitan area and nationally. Admission to the program requires the meeting of regular graduate admission in addition to successful completion of a departmental interview. Other elements of the program are discussed below.

In-Service Student Teaching

The individual in this program must register as soon as possible for I.A. 385—student teaching or internship—for a period of two semesters. Registration enrollment must be 5 s.h. per semester (total of 10 s.h.) and graduate fees must be paid.

During this time, the intern attends a weekly student teaching seminar in which such activities as micro-teaching, role playing, simulation, organizational problems, and curriculum ideas are discussed. A student teaching handbook has been developed for use in this class. In addition, each intern is visited between 5 and 8 times per semester. An observation check sheet is utilized and each student is given a written report describing general laboratory conditions, organization and management, safety hazards, and his educational program. A carbon copy of these reports is sent to the school principal.

If a student does not receive a satisfactory grade the first time he enrolls in student teaching, he must repeat that semester. An unsatisfactory grade for more than one semester will result in termination of his enrollment in the program.

Technical Competencies

Since the industrial arts intern did not have a background in industrial arts at the undergraduate level, he must enroll in the following undergraduate technical courses to meet the basic competencies prescribed in the regular pre-service certification program.

Ind. Arts 170 – Processing Industrial Materials	2 s.h.
Ind. Arts 171 – Ind. Materials for Manufacturing	2 s.h.
Ind. Arts 172 – Ind. Materials for Construction	2 s.h.
Ind. Arts 180 – Energy Sources and Conversion Devices	2 s.h.
Ind. Arts 181 – Energy and Power Transmission	2 s.h.
Ind. Arts 182 – Energy and Power Utilization	2 s.h.
Ind. Arts 190 – Graphic Representation	2 s.h.
Ind. Arts 191 – Graphic Reproduction	2 s.h.
Ind. Arts 192 – Computerization and Cybernation	2 s.h.
Ind. Arts 270 – Research and Development	2 s.h.
Ind. Arts 271 – Planning for Manufacturing and Prod.	2 s.h.
Ind. Arts 272 – Servicing Industrial Products	2 s.h.
Ind. Arts 273 – Simulating Industry	3 s.h.

Individuals with a technical background in such fields as engineering may receive transfer credit of some of their undergraduate courses to replace some of the technical courses listed above. Such credit will be determined by an evaluation of each course, conducted by the industrial arts faculty. In addition, competency examinations are offered for each of these laboratory courses at the end of the semester preceding the registration period for the semester in which the course is to be offered. Individuals who pass the exams may pay an examination fee and have the credit placed on their transcript. Those students who fail an examination must enroll in this course.

Professional Competencies

In addition to the technical coursework and student teaching, each intern must enroll in those professional courses designed to provide the basic competencies of the undergraduate program. Since all courses are at the 300 level or above, graduate credit may be received. These courses are as follows:

Gen. Ed. Psych	331 – Learning Theories and Education	3 s.h.
Gen. Ed. Psych	341 – Concepts in Human Development	3 s.h.
Found. of Ed.	371 – Social Foundations of Education	3 s.h.
Ind. Arts	381 – Lab Organization and Management	3 s.h.
Ind. Arts	382 – Princ. and Prac. of Ind. Arts	3 s.h.
Ind. Arts	383 – Curr. Construc. in Ind. Arts	3 s.h.
Ind. Arts	384 – Methods of Teaching Ind. Arts	3 s.h.

Graduate Requirements

In addition to the 21 s.h. of courses specified in Section IV, each intern must enroll also in those additional courses required for completion of the Master of Education Degree. These courses are as follows:

Voc. Ed. 507 – History and Philosophy of Voc. Ed.	3 s.h.
Voc. Ed. 950 – Research in Vocational Education	3 s.h.
One graduate-level elective	3 s.h.

EXTERNSHIPS

The externship is a program by which pre-service industrial arts undergraduate students may acquire their technical competencies in Philadelphia public schools working alongside industrial arts teachers and students in selected junior and senior high schools. Students are placed in a school setting much as they would be for student teaching. Their primary goal, however, is the acquisition of technical rather than pedagogical skills.

Since the Temple University industrial arts program is based upon occupational clusters, the student rotates through all the laboratories in a given cluster for one semester. Thus, a student enrolled in an industrial materials externship for one semester (twelve semester hours of credit) would spend 24 contact hours per week in the various laboratories of a school related to industrial materials. This experience is augmented by a weekly seminar held on the Temple University campus and additional technical work as may be needed by the student on the university laboratory support facility. Each cooperating teacher in the public school receives a tuition waiver form for three semester hours of credit for each semester of his participation in the program. A maximum of two university students may work in a public school facility at any given time. Thus, a cooperating school with five industrial arts teachers could accommodate up to 10 Temple University externs. Since a full-time externship supervisory load for a university professor has been established at 20 externs, one university supervisor can devote his full efforts to the activities of externs at two site locations.

To insure a valid experience for each extern, competency lists for each cluster are under development. Utilizing these tests, the extern, the university supervisor, and the cooperating teacher can maintain an accurate record of the progress made by each extern and work on areas of deficiency. If an area of deficiency develops and no equipment at the local school is available to provide the needed technical skills, the extern acquires these competencies by working on equipment available in the university-based support facility.

Each student at Temple University rotates through three externships: industrial materials, power technology, and visual communications. In addition, other laboratory courses are provided on campus to extend technical competencies and provide experiences in other innovative programs.

The role of each of the individuals involved in the externship has been defined as follows:

Role of the Student

1. Acquire competencies on the competency list provided through
   - observing teacher demonstrations
   - participating in lab activities with public school students
   - receiving instruction from Temple University supervisors
   - participating in independent study and individualized instruction
   - participating in additional technical activities utilizing the university support facility
2. Provide paraprofessional support to the teachers as technical competencies are developed.
3. Attend scheduled seminars for additional instruction, evaluation, and technical skill development.
4. Maintain a daily log of activities conducted.
5. Develop notes, materials, and learning packages to use when in his own teaching situation.

Role of the Public School Teacher

1. Provide instruction in the basic technical skills
   - as an integral part of his regular classes
   - through additional attention as needed
2. Meet with the Temple University supervisor to assess each student's progress and growth.
3. Provide some pedagogical skills and use the students in a differentiated staffing capacity.
4. Verify student progress on the competency lists.

Role of the Temple University Supervisor

1. Develop competency lists of technical and pedagogical tasks to be achieved by each student. This list must include the competencies for the Philadelphia

examinations for employment of industrial arts teachers.

2. Develop and maintain a working relationship with the school system staff.
3. Supervise each Temple University student
   - assess progress
   - provide supplemental instruction
4. Review student logs and maintain separate anecdotal records.
5. Remove students from situations as needed.
6. Conduct scheduled seminars for additional instruction and evaluation.
7. Provide additional technical support at the campus facility.

A Sample Program

General Education			48 s.h.
A. Humanities		6 s.h.	
B. Social Sciences		6 s.h.	
C. Natural Sciences and Mathematics		6 s.h.	
D. Human Performance		6 s.h.	
E. Electives		24 s.h.	
Professional Education			80 s.h.
A. General Professional Education		11 s.h.	
Ed. Psychology 101 - Human Development	(4 cr)		
Ed. Psychology 102 - Principles of Learning	(4 cr)		
Ed. Foundations 201 - Social Emphasis	(3 cr)		
B. Industrial Arts Professional Education Sequence		19 s.h.	
Ind. Arts 382 - Prin. & Prac. of Ind. Arts	(3 cr)		
Ind. Arts 383 - Curr. Construc. in Ind. Arts	(3 cr)		
Ind. Arts 384 - Methods of Teaching Ind. Arts	(3 cr)		
Ind. Arts 385 - Student Teaching or Internship	(10 cr)		
C. Industrial Arts Technical Core		43 s.h.	
Ind. Arts 172 - Ind. Material for Construction	(2 cr)		
Ind. Arts 181 - Energy & Power Transmission	(2 cr)		
Ind. Arts 273 - Simulating Industry	(3 cr)		
Ind. Arts 290 - Ind. Materials Externship	(12 cr)		
Ind. Arts 291 - Power Technology Externship	(12 cr)		
Ind. Arts 292 - Visual Communic. Externship	(12 cr)		
D. Industrial Arts Electives		7 s.h.	

Competency Lists

As a relatively new program at Temple University, industrial arts was established with a competency-based approach. Consequently, it must be shown that the competencies acquired through the externship would equal those provided through formal courses that would be equated to the externship. This is accomplished through the development of detailed check lists, specifying the precise tasks that emanate from each broad-based competency. Although such an exhaustive list is not yet available, the following behavioral tasks are a few samples that relate to several broad competencies. Following continued implementation of the externship model, these tasks will be further refined and developed for use by the students, cooperating teachers, and supervisors.

Industrial Materials

Given an industrial material, each teacher will describe the initial extraction and refinement of the raw materials that were used to produce this industrial material. This will include such materials as forest products, both ferrous and non-ferrous metals, plastics, textiles, ceramics, and concretious materials.

Describe the extraction, refinement, and controlled production of sizes of the following materials: Ferrous metals, non-ferrous metals, hard and soft woods, thermoplastics and thermosetting plastics, natural inorganic materials, synthetic inorganic materials, miscellaneous natural organic materials. When possible, production of these materials will be simulated in the laboratory. Describe procedures by which these materials can be identified, where they can be purchased, and their cost.

Given an industrial material, each teacher will conduct tests to determine the structure and characteristics of that material. Examples of these characteristics include: hardness, color, texture, density, plasticity, conductivity, ductility, malleability, corrosion resistance, acidity, alkalinity, etc.

> Conduct tests on the following testing machines: a) Universal, b) Brinnell, c) Rockwell, d) Scleroscope using samples of materials appropriate to the particular test equipment. Samples will be prepared by the students using appropriate mixing, combining, forming, separating processes and by changing properties by hard curing, tempering, annealing, or other methods.
>
> Based on results of tests, materials will be compared to determine tensile strength, modulus of elasticity, compressive strength, hardness, weight, and so on.

Visual Communications

Each teacher will state the implications of visual communications on commerce, aesthetics, his daily life, industry, and education.

Each teacher will state the historical aspects of visual communications, its chronological evolution, the current need for visual communications, and the allied and related industries related to the visual communication complex.

Given an object, each teacher will develop a representation of that object using signs, symbols, alphabet, and dimensions acceptable in the graphics industry. The representation must be accurate and to tolerances so that another individual could make the product from the drawing. Use of orthographic projection, isometrics, pictorials, and renderings will be included.

A. Sketching (Technical) – execute one each
  1. Isometric
  2. Oblique
  3. Orthographic
  4. Working sketch

B. Alphabet of Lines – execute
  1. Multiview Projection
    a. Orthographic
    b. Working Drawings
    c. Assembly Drawing
    d. Exploded Drawing
  2. Axiometric Projection
    a. Isometric Projection
    b. Isometric Drawing
  3. Oblique Projection
    a. Cavalier
    b. Cabinet

Power Technology

Each teacher will state and demonstrate the sources, characteristics, and uses of each of the following energy sources: muscle, wind, water, fossil fuels, heat, light, sound, friction, magnetism, piezoelectric effect, chemical, and nuclear.

> Given a basic AC and DC power source, each student will develop measurement techniques encompassing the use of basic electrical test equipment such as a VTVM, VOM, Oscilloscope, tube tester, signal generator, and oscillators.
>
> Students will investigate input and output characteristics and measurement of prime movers and power such as horsepower, torque, vpm, and efficiency.
>
> Students will apply the principles of operation of selected external combustion engines to the design and fabrication of a miniaturized prime mover.

In summary, the internship and externship programs described present only two alternatives to be considered in the preparation of urban industrial teachers. Various other options are available and need to be developed to provide wider alternatives. Regardless of the proposal, however, emphasis must be placed on the illustrated guides and bringing together the university and the urban community in the development of a partnership in the preparation of all teachers for the urban setting.

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TECHNOLOGY

Toward a Rationale for the Study of Technology

S. F. Kasprzyk

"The important thing on which we are all agreed is the critical need for industrial arts to reflect the technology." So states William E. Warner in a recent reprint of the Ohio State University curriculum proposal which in 1947 introduced the concept of technology into industrial arts education.[1]

Since then, and more notably during the past decade, reference to technology in the industrial arts literature has been so frequent that perhaps we in the profession do agree that industrial arts ought "to reflect the technology." At the same time, curiously, there appears to be little if any evidence to indicate that "we are all agreed" on whatever it is that industrial arts ought to "reflect" when we say the industrial arts ought "to reflect the technology." In view of the seeming paradox, perhaps there is a critical need for the profession to reflect upon (i.e., give serious consideration to) and make explicit the rationale (the underlying principles) for its technology-centered conceptions of industrial arts education, and thereby justify the basic assumption that industrial arts ought to center on the study of technology.

The fundamental task in working toward a rationale is conceptual clarification, with priority given to the central concept — technology. Needless to say, the common dictionary-type definition will not do. For to be of epistemic value, the concept of technology needs to be located and defined within a theoretical framework of interrelated concepts, a framework which can be used to identify a unique body of knowledge for industrial arts education. What is needed, then, is a functional definition.

In order to establish a basis for a ruminating discussion on the concept of technology and its significance in working toward a rationale for industrial arts education, let us take a look at one such definition, one that was developed by Harold G. Cassidy of Yale University.[2] It will be presented here in its barest essentials merely to show how the concept of technology is located and defined in the context of related concepts.

1. Cassidy locates technology in a conceptual scheme according to which "the arts" and "the sciences" constitute the universe of human knowledge. His basic assumption is that "all the practical things that we do or that we experience have been influenced by efforts that may be classed as humanistic (the arts) or scientific." (1)

2. The terms 'art' and 'science' refer to the various activities engaged in by artists (painters, poets, musicians) and scientists (physicists, chemists, biologists) "as we observe them," Cassidy says, "from the results they obtain, and from what they are doing and how." (9-10) 'The arts' and 'the sciences,' on the other hand, are terms generalized from the various disciplines "that are embodied in college and university departments of instruction." (10) The arts and the sciences may be visualized as constituting the halves of a circle, with literature, the fine arts, language, and logic occupying positions on one half of the circle, and the physical, biological, social, behavioral, and policy sciences occupying the other. Somewhere between these disciplines, Cassidy locates history at a point opposite mathematics; these disciplines, he says, have a place in both, the arts and the sciences. (See Figure 1)

The visual representation, Cassidy insists, should not be interpreted "too literally" for, aside from suggesting a "connectedness" between the disciplines, it is intended only to show "that the field of knowledge and experience comprising the arts and sciences is a continuum." (11)

3. All of the disciplines which constitute the field of knowledge and experience are characterized by three related and overlapping "types" of activities: "Analytic, synthetic, and reduction to practice." (21 ff.) Analytic activity involves observing, naming, and reporting observations, and the accumulating and classifying of resultant data from artistic and/or scientific experience. Synthetic activity involves searching for connections and relationships among the accumulated data, hypothesizing, theorizing, and formulating laws on the basis of the discerned connections and relationships. Synthetic activities are conducted via two processes: inductive and deductive. The process of bringing to light new knowledge, new discoveries (i.e., previously unknown elements, properties, and their behaviors), is the inductive process; the process of synthesizing the data, formulating theories and deducing laws therefrom, is inductive. The activity which seeks to validate the theories and laws in practice, or aims to apply them to utilitarian ends, Cassidy refers to as reduction to practice. (21 ff.)

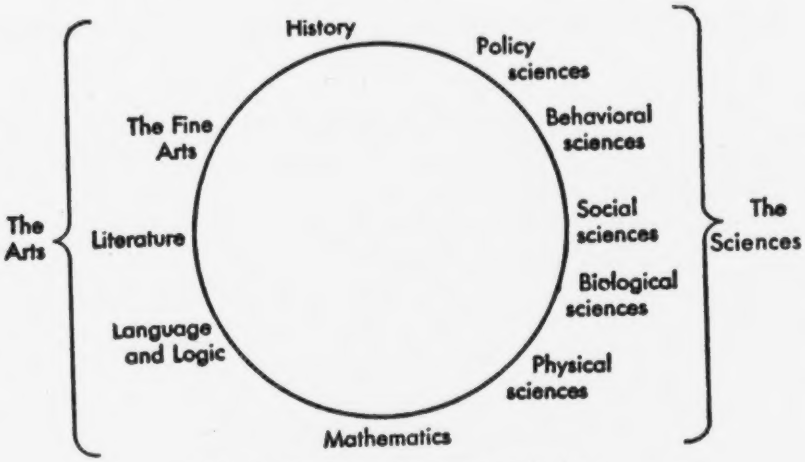
History
Policy sciences
Behavioral sciences
Social sciences
Biological sciences
Physical sciences
Mathematics
Language and Logic
Literature
The Fine Arts
The Arts
The Sciences

Figure 1. Definition of the Sciences and the Arts.
(From The Arts and the Sciences, p. 11)

Analysis and synthesis are constant ongoing activities in the arts and the sciences. Emphasis on synthesis, according to Cassidy, defines philosophy, whereas reduction to practice defines technology. All of the disciplines are interrelated, and every discipline involves "the pursuit of all three activities." (24) The interrelations of the three types of activities are explainable in the framework of Cassidy's second visual model, which he names the "continuum." (See Figure 2)

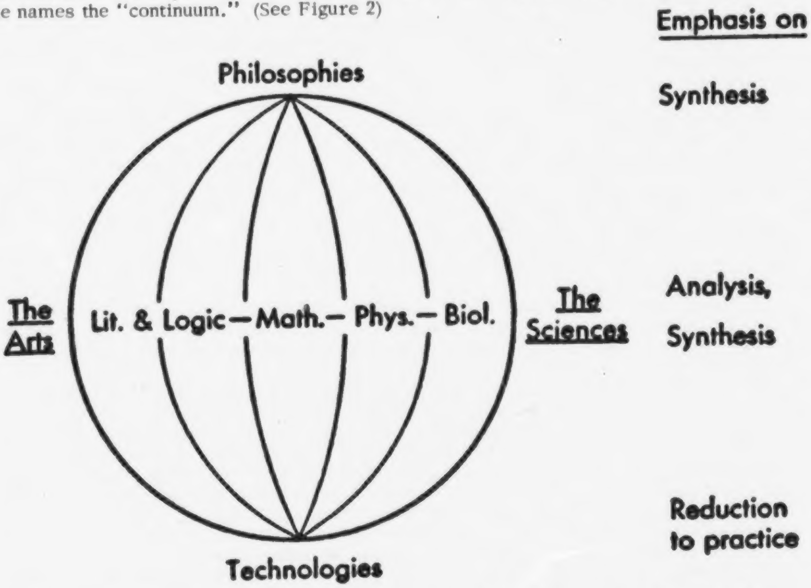
Emphasis on
Philosophies
Synthesis
The Arts
Lit. & Logic — Math. — Phys. — Biol.
The Sciences
Analysis, Synthesis
Reduction to practice
Technologies

Figure 2. Continuum. The university is diagrammed in terms of disciplines on the surface of a sphere. The disciplines which are used to define the arts and the sciences are arranged in a belt about the equator. (From The Arts and the Sciences, pp. 24 & 148).

4. From Cassidy's model of the continuum, it may be inferred that every discipline has its philosophical and technological dimensions: for every art there is a philosophy of art and a technology of art; likewise, for every science there is a philosophy of science and a technology of science. The confluence of all the arts and sciences at the upper pole of the sphere depicted in Figure 2 represents general philosophy; at the lower pole, general technology. Together, the arts, the sciences, the philosophies, and the technologies constitute "the four divisions of the continuum of knowledge as they are exemplified in the university." (24) None of the disciplines "is exclusively technological or analytic or synthetic," Cassidy notes:

> Thus, if engineering were a discipline which taught only the application of knowledge, it would not belong in a university but in a trade school; it would be not a technology but a craft or technique. The same applies to writing, law, medicine, and other technologies. What gives the technologies equal status with the arts, sciences, and philosophies is that they include the analysis and generalization of their own principles and the utilization of these to control and refine their practice. This is why research is emphasized in all the technologies: research is a term for the application of analysis, synthesis, and reduction to practice in a pioneering way. (24-25)

The foregoing analysis of Cassidy's theoretical model, coupled with the citation, sufficiently clarifies his conception of technology. Whether one accepts or rejects his thesis is a course irrelevant to the purpose for which it was presented here: namely, to show how one writer defines technology in the context of related concepts.

In any event, several pertinent observations can be gleaned from the analysis to furnish a basis for a ruminating discussion on the concept of technology. Note that technology is defined as a kind of human activity framed in a theoretical model of academic disciplines; because the definition is theoretically conceived, the theory furnishes the rationale for justifying the place of technology among the disciplines; in itself it is not a discipline as such, but has a place in all disciplines; technological activity can be distinguished from other activities by its "reduction to practice" function; as such, it differs markedly from the kinds of activities engaged in by "artists," "scientists," and "technicians," (5) so-called. This distinction, often ignored by educators and writers, is of paramount importance in working toward a rationale for the study of technology in industrial arts education.

REFERENCES

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(2) Harold Gomes Cassidy, The Sciences and the Arts (New York: Harper and Brothers, 1962). Note: the numbers enclosed in parentheses in the text refer to page numbers in Cassidy's book.

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The Industrial Technologies: Identification and Implementation

Rex A. Nelson

Numerous attempts have been made to identify the industrial technologies. Many of these efforts attempted to place an emerging knowledge area, technology, into existing knowledge areas. Even with these numerous attempts, the industrial arts area still has not identified its role or obligation in relation to technology.

This paper will begin by identifying the differing aspects of technology; second, a perspective of the industrial technologies will be developed; and third, the technological activities of industry will be identified for implementation.

Technology today is identified as the instrument that man uses to insure his chances of survival and dominance in the environments. Man has utilized technology in a manner similar to his use or misuse of other tools. In technology he found an instrument which he could use to meet the challenge of his environments to bring about changes in these environments to satisfy his needs and wants. Man has used technology at random whenever he desired to change the environments and, in essence, misused technology.

Man's second reaction to technology can be likened to that of a man who is casually using a hammer to drive a nail and hits his finger. The man's usual response is to curse the hammer and blame it for hurting his finger. Within the past decade, man has been blaming technology, his instrument for changing his environments to meet his needs and wants, for injuries to the environments caused by his mis-direction of the instrument.

Man is presently beginning to recognize technology as his instrument for *purposefully* changing his environments. Man also is beginning to realize that without technology he would be little more than another animal in the environment. Consequently, man is placing himself at the center of responsibility for his instrument, technology. Both man and technology are seen as a part of man's reaction to situations which confront him in his environments. These environments are identified as: (1) the natural, biotic, or living, environment, consisting of plants, animals, micro-organisms, etc.; (2) the psychic environment, consisting of the mental, emotional, spiritual, or mind of man; (3) the social environment, consisting of the interdependent nature of man; and (4) the physical, abiotic, or non-living environment, consisting of air, water, minerals, man-made objects, etc.

Man responds to situations he faces in these environments through systematic processes. He investigates his environments and makes discoveries about them from which he develops *techniques* to utilize these discoveries to satisfy his wants and needs.

When several techniques are developed to utilize a discovery, man is placed in the position of having to make a *decision* about which technique to use to satisfy a want or need. The decision to use or not use a particular technique is made by man, regardless of whether or not the technique and decision are later found to be right or wrong.

Once man makes the decision to utilize a particular technique in a given situation, he has the opportunity to make an *application* of the technique to purposefully change the situation, and to perfect the application through practice.

These four elements — discoveries, techniques, decisions, and application — comprise a system by which man reacts to situations he faces in his environments.

In order for man to carry on this system of taking action in environmental situations, he must have knowledge areas which parallel the elements of discoveries, techniques, decisions, and applications. They would have to be included in the educational system, since any educational system involves knowledge in one form or another. The element of environmental discoveries may be paralleled with the knowledge area of the sciences, where man is observing and classifying facts in and about his environments; the element of the techniques man develops to use discoveries derived from his environments may be paralleled with the knowledge area of the technologies, where man is using knowledge to develop techniques for purposefully changing his environments; the element of making decisions about which technique to use to satisfy a need or want may be paralleled with the knowledge area of the *humanities*, where man is determining the human attributes and qualities of his reactions to the situations he faces in his environments; and the element of application of the technique which man has decided to use to satisfy a need or want may be paralleled with the applied arts, where man is applying knowledge and perfecting skills to make or do things to satisfy his wants or needs.

The topic being discussed here is directly concerned with the technology knowledge area. The other three elements and parallel knowledge areas are included simply because they interrelate with technology in systems that man uses to take action in situations he faces in his environments.

In recent years, man has been abruptly confronted by technology because of the gross potential of technology and the numerous techniques from which he must make decisions. With the massive and multiple technologies, man finds himself in the position of having to make decisions before techniques are placed into practice rather than taking the attitude of wait and see.

This confrontation has resulted in three unacceptable views of technology. The first view identifies technology as an unmitigated curse to mankind. The second view identifies technology as an unalloyed blessing without blemish. The third unacceptable view is apathy, simply claiming that technology is either a force of its own or unworthy of man's attention or concern.

Man is beginning to take a more knowledgeable view of technology, recognizing that techniques or technologies are but an instrument to be utilized in bringing about purposeful changes in the environments and that only an ignorant man places the blame for his actions on the instrument he uses.

Since technology is frequently referred to as applied science, it would only appear logical that there must be a technology which parallels each of the sciences. There must be a technology identified with: (1) the natural (biotic) sciences; (2) the psychic sciences; (3) the social sciences, and (4) the physical (abiotic) sciences. Consequently, there is: (1) a natural technology: "Man's purposeful pursuit of changes in techniques for that part of the environment which includes purely natural (biotic) factors, including man"; (2) a psychic technology: "Man's purposeful pursuit of changes in techniques for that part of his environment which includes purely emotional, mental, and spiritual factors"; (3) a social technology: "Man's purposeful pursuit of changes in techniques for that part of his environment which includes the cooperative and interdependent nature of man factor;" and (4) a physical technology: "Man's purposeful pursuit of changes in techniques for that part of the environment which includes purely physical (abiotic) factors, including man-made objects."

To complete the illustration of the systems man uses to react to situations he faces, a parallel set of decisions or humanities and a parallel set of applications or applied arts for each of the environments would have to be identified and described. These knowledge bases, the sciences, humanities, technologies, and applied arts, not only establish a system which man uses to take action in situations he faces in his environments, but also are identified with the four major discipline areas of knowledge in education.

Evidently the entire system of man's actions in the situations he faces cannot be discussed in a paper designed to identify only the industrial technologies. Consequently, the question arises as to where the industrial technologies exist in the knowledge area of technology. They probably would be derived from the physical (abiotic) technology, especially the man-made part of the physical technology. Consequently, the focus of this paper becomes an examination of industry, a situation which faces man, to identify the industrial technologies. Industry also involves the sciences (discoveries), the humanities (decisions), and the applied arts (applications).

Industry as discussed herein is defined as:

> A group of productive profit-making enterprises or organizations that have a similar technological structure of production and that produce or supply technically substitutable goods, services, or income(1).

With technology identified as a part of the system man uses to take action in situations he faces in his environments, and with industry defined and identified as one of the situations man faces, the technology of techniques that are utilized by man to bring about purposeful changes in and with industry may be identified. Techniques of industry, like techniques in other situations of man, are now numerous and have the potential of massive impact upon man, his situations, and his environments. Consequently, the industrial technologies must be carefully examined and knowledgeable decisions made before industrial techniques are placed into practice.

Since the definition of industry states that industrial organizations have "a similar technological structure of production," an examination of this technological structure would identify the industrial technologies.

One of the first techniques involved in any industrial enterprise is its organizational structure. This may be changed purposefully in order to change the enterprise, the product, or the benefit to man. Consequently, the similarities and differences of techniques for industrial organization are identified as one of the major industrial technologies.

Additional major technologies or techniques of industry may be identified with other major activity areas of industry. A model of these major activity areas has been developed by the Association of Consulting Management Engineers.(2) Evidently the objectives of an industrial enterprise are carried out through these major activity areas which also bring about purposeful changes in the enterprise, its objectives, and operations when the occasion or need arises.

Consequently, besides the technique of bringing about purposeful changes in an industrial enterprise by changing its basic organizational structure, there are the techniques of changing its actions through techniques of industrial management; research and development; production; marketing; financing; personnel administration; external relations; and legal techniques. Since they are being used to bring about changes in the functioning of industry, these techniques must be recognized as the major industrial technologies.

There would be numerous subtechnologies within each of these major technologies. Industrial man is constantly having to make decisions about which of these techniques should be used to bring about purposeful changes in the enterprise or its functions, before the technique is placed into practice.

Since industrial arts lays claim to a study of industry, it would appear that industrial arts would be negating its responsibility to learners and to the society to which it is contracted if a study of the totality of industry as it faces man was not presented to learners. Consequently, it becomes an obligation of industrial arts to engage the total equation of man and his actions in and with industry, an equation which includes elements of each of the four major discipline areas: (1) sciences (discoveries in the environments as they relate to industry); (2) the technologies (techniques by which man utilizes discoveries to bring about purposeful changes in and with industry); (3) the humanities (the decision-making processes which are utilized by and impinge upon industry); and (4) the applied arts (practices by which man places selected techniques into process to make man-made objects to satisfy his wants and needs.)

The necessity of implementing these elements of industry in education, specifically the industrial arts area, cannot be over-emphasized. Industrial arts has contracted with the society, the educational system of the society, and most of all with the learners, to make a study of industry available through the educational system. If industrial arts does not pick up its responsibilities for the totality of industry, including its technologies, then industrial arts is neither fulfilling its educational contract nor realistically assisting future participants in a society which includes industry to make choices regarding their role in or with industry. Furthermore, industrial arts must engage the full equation of the situation man faces with industry in order for future man to be knowledgeable of industrial discoveries, develop a maximum of industrial techniques from these discoveries, make and accept the responsibilities of decisions related to industry, and to place the techniques of industry into practice based on human attributes and qualities related to these techniques and practices.

SUMMARY

It is my belief that industrial arts can best implement the elements of industry by emulating industry in an educational setting, based on a continuum of a study of industry. I see little problem in identifying industrial arts with, or accepting, the major activity areas, functions, and sub-functions of the industrial model developed by the Association of Consulting Management Engineers, Inc. (2). The largest problem exists with industrial arts educators who want to argue about whether or not this model is representative of industry. My usual answer to these skeptics is to encourage them to argue with the Consultants. If the Consultants change their model based upon the educators' argument, then I will also change my acceptance of the model. But, as a teacher who is interested in bringing a total study of industry to learners at all levels, I still have the educational problem of implementing an educational continuum for the body of knowledge of industry, to meet the needs of learners as they grow in their need for knowledge of industry.

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Technological Literacy: The Central Focus of Industrial Arts Education

C. Dale Lemons

"Industrial Arts and the Challenge of the Urban Society"	1973
"Industrial Arts in a Changing Society"	1972
"Industrial Arts and Space Age Technology"	1971
"Man/Society/Technology"	1970
"Where The Action Is"	1969
"New Concepts in Industrial Arts"	1968
"Industrial Arts and Technology — Past, Present and Future"	1967

These titles are the themes for conferences of the American Industrial Arts Association since 1967, all of which indicate dynamic, positive attitudes for industrial arts educators. They further suggest sensitivity to the environment in which we live — a searching for the most critical needs to be met through education. This has been the history of industrial arts. Just as the world in which we live has become more complex and technically sophisticated, so has industrial arts continued to change to meet the challenge. The questions are have we changed rapidly enough and have the changes occurred with objectives clearly defined. Any change has direction, but only when that direction is clearly toward an identified and defined objective can progress be measured.

It is not my intent in this paper to clearly define the objective, but to identify that objective. I shall attempt to present a rationale for the position that the central focus of industrial arts is technological literacy. This I shall do by examining, briefly, our historical heritage, contemporary concerns in a technological society, and the need for preparing youth to function effectively in a technological, democratic society of the future.

In developing this rationale, it is essential that certain terms be clarified in a context of this topic. Most important is that you understand to what I am referring when using the term "technological literacy." The term technology alone has been used in so many different contexts that it does not clearly communicate, or communicates poorly. Commonly, it is used simply to include hardware, whereas others use it to include all of man's application of knowledge. It is no wonder then that confusion exists about the meaning of the term when used by any individual. Therefore, let me spend just a few minutes to explore what is meant by technology.

Delmar Olson has defined technology by providing some of its identities. The following are a few of these identities of technology.

> Technology is the material culture. It is the total of what man knows and does with materials. It has a history as old as pre-man and a future as great as man's imagination. Technology is man creating his own environment on earth, in air, in space, and in the sea, enabling him to live where he will. . . . . Technology is man expressing himself with materials, tools, machines, and energies . . . . (12, p. 34-35)

A dictionary definition of technology is "the totality of the means employed to provide objects necessary for human sustenance and comfort." (17, p. 905) In most readings about technology, reference is made to the "material culture;" however, a more generally-accepted definition would include not only the objects but the services provided.

The Industrial Arts Curriculum Project staff equated technology with praxiology and used the latter term to mean "the science of the application of knowledge to practical purposes." (16, p. 33) This was interpreted not only to include the application of knowledge but also the "knowledge of practical action."

Considering all these variations and interpretations of the term, not to mention the many not discussed, it is hazardous to suggest one concise definition that will communicate accurately to all. Nevertheless, I do suggest the following as a working definition. Technology is man's employment of physical or intellectual aids to provide objects or services for human needs and wants.

The term literacy is not as controversial as technology and is generally understood to mean having the ability to read and write. As used in the context of "technological literacy," however, the fuller meaning of being educated is intended. Therefore, the term "technological literacy" is defined as being educated about technology. If one is to be educated, it follows that there should be a reason or purpose for the education, and I suggest that this purpose is to understand man/society/technology relationships as is essential to effective citizenship in a technological, democratic society.

The historical bases for this position are quite clear to me, but to recap briefly the evolution of industrial arts education may be helpful. This development shows that industrial arts educators have been sensitive to the changing needs of our society, even if somewhat slow in effecting change in the programs. In the United States, manual training was implemented as a result of the impact of industrialization on our society — reflecting a desire to develop manipulative skills related to the mechanical trades and thus add a new dimension to the education of boys. This sterile and mechanistic approach to instruction was later criticized by leaders in the field as failing to provide opportunities for creativity and design, and "manual arts" ushered in an era of thing-making.

Industrial arts then developed as a study of the elements of industry and was recommended for all youth. The interpretation of the goals of industrial arts varied considerably and still does. Dr. Kenneth Brown, in an excellent article in the February 1973 issue of Man/Society/Technology, identified three concepts of industrial arts:

1. Manual Training, the mechanical trades, Russian in origin, focused on the village trades of 19th century Europe and oriented to the past, with the central theme of tool skills and job performance.
2. American Industry — American in origin and focused upon the elements of American industry. This he described as oriented to the eternal present, with the central theme of understanding the organization and operation of industry.
3. The Technology — American in origin and focused upon the study of industrial technology. It is oriented to the span of human history, the central theme being concepts and principles in transforming materials and energy. (2, p. 211)

I think that if we examine programs across this country, examples of all three concepts can be found, with perhaps more of manual training than technology. Program implementation follows considerably behind the thinking of leaders in our field. An excellent example of this may be observed in Frederick Bonser's definition of industrial arts as stated in the early twenties,

> . . . industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes. (1, p. 3)

Although many definitions have been developed since that time with more specific reference to the content of study, few, if any, have improved on the challenge to us. With a contemporary interpretation of "materials" and of "the problems of life related to these changes," this definition could easily be saying man/society/technology. Compare Bonser's definition with that offered for discussion in the Guidelines for Industrial Arts in Career Education.

> Industrial arts education is that subject which provides opportunities for all students from elementary through higher education to develop an understanding about the technical, consumer, occupational, recreational, organizational, managerial, social, historical, and cultural aspects of industry and technology. Furthermore, it is a program whereby students acquire industrial-technical knowledge and skills through creative and problem-solving learning experiences involving such activities as experimenting, planning, designing, constructing, evaluating, and using tools, machines, materials, and processes. (6, p. 7)

I am not suggesting a criticism of either, but merely observing that the earlier definition provided the opportunity to cover all that is stated in the latter and perhaps more.

Nevertheless, as leaders of the profession have maintained sensitivity to changing technology, society, and educational theory, so it should continue. Therefore, if current and emerging technology, societal conditions, and educational theory are carefully examined, I believe that it would be evident that the central focus of industrial arts should be on man/society/technology or technological literacy.

While I recognize that in a group as cognizant of the importance of technology as you are there is little need to explore it further, permit me to address a few remarks toward relationships. Juergen Schmandt, Associate Director of the Program on Technology and

Society, Harvard University, stated that,

> Man is a technological being. Technology is a necessary condition of human progress. (13, p.1)

He further said,

> . . . that technological change leads to social and institutional change. Technological innovation is just the first step in a long chain of innovations. (13, p. 13)

Alvin Toffler, in presenting the accelerative thrust of technology, stated,

> It is vital to understand, moreover, that technological innovation does not merely combine and re-combine machines and techniques. Important new machines do more than suggest or compel changes in other machines—they suggest novel solutions to social, philosophical, even personal problems. They alter man's total intellectual environment—the way he thinks and looks at the world. (15, p. 29)

With this recognition of the power and impact of technology on man and in our society, what then is the problem? I think we would agree that not all are cognizant of the magnitude of technological development nor acceptant of the value of technology to the society. In fact, evidence exists that many in our country are technologically illiterate, and this includes the leaders of our country. Dr. Abraham Fischler, President of Nova University, in addressing the Southeast MAN/SOCIETY/TECHNOLOGY forum, stated,

> Little did I realize that five years ago there was not one scientist sitting in Congress. Yet better than 50% of the deliberation in which Congress was engaged at that time had to do with technology and science. How many times has the general populace asked to be made aware of the changes in their lives resulting from technology? On the ballot are such issues as fluoridation of water. However, there are the problems of food nutrition; non-leaded gasoline; varieties of pollutants; the placement of nuclear power plants; the safety of these in relation to the general public. These and many more force us to come to grips with the issues of educating the populace to life in a technological world. (5, p. 10)

Dr. Donald Maley also expressed concern for this illiteracy at the Mid-East MAN/-SOCIETY/TECHNOLOGY forum.

> The problem is an ever widening gap between the technologist (the technical elite) and the great masses of people who use or must make decisions about the application, acceptance, or rejection of that technology. (9, p. 60)

The gap that exists between technological development and man's acceptance or ability to change is further widened, according to critics, by failure of the educational system to prepare us for these adaptations. Again, I quote from Alvin Toffler.

> In the quickening race to put men and machines on the planets, tremendous resources are devoted to making possible a 'soft landing.' Every sub-system of the landing craft is exquisitely designed to withstand the shock of arrival. Armies of engineers, geologists, physicists, metallurgists, and other specialists concentrate years of work on the problem of landing impact. Failure of any sub-system to function after touch-down could destroy human lives, not to mention billions of dollars worth of apparatus and tens of thousands of man-years of labor.
>
> Today one billion human beings, the total population of technology-rich nations, are speeding toward a rendezvous with super-industrialism. Must we experience mass future shock? Or can we, too, achieve a 'soft landing?' We are rapidly accelerating our approach. The craggy outlines of the new society are emerging from the mists of tomorrow. Yet even as we speed closer, evidence mounts that one of our most critical sub-systems—education—is dangerously malfunctioning. (15, p. 353)

As we plan educational programs, we fail to be future-oriented. We live in the past or at best in the present and plan educational programs for youth with that base. As stated by Dr. John McKetta,

> You and I don't stop to think that these young men and women in our classes will be active in their professional life up until the year 2015 or 2020. We should teach them the type of information that will help them to be active in, and to contribute to, the fabulous future that you and I just can't even believe exists for them. (10, p. 14)

Although we can look with pride and some degree of satisfaction at the number of youth that have benefited from industrial arts in the past, we also must recognize and accept a failure to prepare them for the state and rate of technological development. We have developed an interest in craftsmanship, an ability to solve some technical problems, instilled in many boys the love of using tools and materials, and occasionally helped them to choose a career. Even many of our innovative programs today, as fine as they are, largely concern a study of past and present practices, with little provision for dealing with future problems. Boardman Moore alluded to this when he stated:

> Equally important is the realization that the clock cannot be turned back to our bucolic past, even if a majority of the population supported the idea. We are geared to the industrial society for better or worse. Which it will be, better or worse, depends on how effectively we educate our contemporaries and youth of this nation to the technological realities of life. (11, p. 22)

We know from status studies such as that by Marshall Schmitt that industrial arts programs are largely comprised of woods, metals, and drawing, with small offerings and enrollment in power, graphic arts, and electronics. (14) Although some progress has been made since the 1962-63 period of that survey, it would be safe to estimate that three-fourths of the industrial arts enrollments today are in drawing, woods, and metals. And while I am sure that within some of these offerings current techniques are being taught, relationships to society are not made.

The emphasis proposed for industrial arts goes far beyond that of developing current techniques. It is not adequate for us to be only current. The rate of technological development and the related rate of decisions to be made demand that we prepare for tomorrow. Toffler expressed this concern simply but forcefully when he stated:

> It is no longer sufficient for Johnny to understand the past. It is not even enough for him to understand the present, for the here-and-now environment will soon vanish. Johnny must learn to anticipate the directions and rate of change. He must, to put it technically, learn to make repeated, probabilistic, increasingly long-range assumptions about the future. And so must Johnny's teachers. (15, p. 357)

Through this presentation I have attempted to establish (1) a historical base for the position that the primary emphasis of industrial arts should be toward technology/society relationships, (2) the state of technological illiteracy, and (3) the inadequacy of the educational system in preparing youth for the technological society of today or tomorrow. Each point could have been expanded for further clarification if time had permitted.

In summary I wish to clarify the position taken by explaining terms that have been used and acknowledging a few of those in our profession who have supported a position similar to this.

1. Technology/society relationships refer to the interface of man, his technology, and the society in which these function. It is intended that through making this the primary emphasis of industrial arts, technological literacy will be developed for effective participation in a democratic, technological society. Further, it is the purpose to develop knowledge of technological change for the application of this knowledge in making decisions about the use of technology as it affects man. This implies a concern for the social, political, and environmental changes resulting from technology. Dr. Donald Maley has proposed a program in which high school students would apply technology to solve societal problems. (9)

2. Technological literacy I define as that knowledge of technology and changing technology enabling one to apply this knowledge in solving technical problems and/or making value judgments concerning the use of technology in civic and personal matters. This would include knowledge about technical occupations of all levels and trends in occupational preparation. Dr. Fred Kagy speaks of technological literacy and occupational literacy as two major goals of industrial arts education. (8)

In implementing programs to accomplish the task of technological literacy, I do not see major deviations from some of the programs presently being used. I believe most of the experimental innovative programs contain elements for improving understanding of technology and society relationships.

However, there must be more research accomplished to define more clearly technological literacy and to identify and structure elements of technological literacy for curriculum development. In a recent study conducted by Dr. James A. Hales, an attempt was made

> 1. To identify the facts, principles, concepts and laws (hereafter referred to as elements) considered essential determinants of technological literacy appropriate for high school graduates.
> 2. To classify and validate the elements through the use of a content by level matrix. (7, p. 4)

Hales accomplished this through the use of the Delphi technique, which consisted of a systematic interrogation of a jury of selected expertise. In his own words,

> The items listed and classified in this research represent an attempt to identify the elements of technological literacy as perceived by ten experts. It is not necessarily a final list, but it is a starting point in the process of trying to determine the composition of technological literacy. (7, p. 105)

Hales identified 411 elements essential as determinants of technological literacy—323 of which were classified by two-thirds consensus in a six-technology category and nine-knowledge-level category matrix. However, a reclassification consultant group could only classify 210 of these elements in the same matrix. (7) This initial research effort by Hales is certainly to be applauded and may pave the way for additional study in this direction. I feel that, as recommended by Hales, parallel studies of this nature with a different mix in experts could identify additional elements. The classification process and the matrix for classification might also be examined further. There is one thing clear to me from examination of this study, and that is that an interdisciplinary program is demanded to fully accomplish technological literacy.

The position that the primary emphasis of industrial arts should be toward technology/society relationships is more a concern for the "why" in industrial arts than the "what" in industrial arts. As this "why" influences the "what," changes in programs will result, but to fully accomplish the task, the total resources of the society must be used. Industrial arts educators must utilize human and material resources from government, labor, industry, and education. The laboratory must be expanded beyond the walls of the "wood shop" and the school building. The activities must include more than tools and materials. The teacher must read about, explore, and integrate himself in affairs of the society beyond making gavels for civic clubs. According to Charles DeCarlo, a former manager for IBM and now President of Sarah Lawrence College,

> Of the highest importance is the educational development of people who can encompass scientific and professional careers, while at the same time remaining open to the responsibilities of individual growth and civic responsibility. (3, p. 66)

Since the beginning of industrial arts, by that name, there has been this purpose of preparing youth to function in an industrial society. Today we have moved past the "industrial society" stage into a "super industrial" or "technological" period, and the problems of life are more complex. Therefore, it is more important than ever before that the primary emphasis of industrial arts be toward preparing citizens to relate technology and societal conditions. As Dr. Paul DeVore stated it,

> Neither segment of education (public schools or colleges) has successfully addressed itself to the human, social, economic, and technological issues and related competencies required for intelligent citizenship. (4, p. v)

I submit to you that our primary responsibility is to develop programs with sufficient vision so that each individual will be able to apply technical knowledge to function effectively in society today and tomorrow, whether he presently lives in an urban or rural area.

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The Secondary Exploration of Technology Project—Title III, ESEA

Harvey Dean

The answer to the age-old question of "What is the role of industrial arts in the full development of the learner?" is again a major topic of a national program. The recent turmoil in education circles has promulgated an even broader quest for more relevant curricula by leaders throughout the United States. Their search has asked, "What should all of education do to develop the learner to his fullest potentialities in career choices?" The role of industrial arts, the role of all of education in all societies — not just the urban society — is of paramount concern to all involved in education and must be viewed from the most encompassing vantage point.

The S.E.T. Project envisioned a 7-12 industrial arts program — sequential in design and progressively more palatable to the learners than typical industrial arts classes. Projections such as . . . "by 1978 a machine will be able to completely produce another machine; and . . . half of the children born in 1972 will be employed in industries which today do not exist . . . by 1980 a method will have been devised to allow the brain to communicate with computers," alerted the Project staff and teachers of the need for a comprehensive, yet practical and realistic model from which to work.

The questions:

Should industrial arts teach knowledge?
Should industrial arts teach skills?
Should industrial arts teach attitudes?

all became major points of concern in preliminary discussion and planning for the S.E.T. Project. A brief of the Project time line and the school districts involved would prove beneficial at this time.

The S.E.T. Project began in May of 1971, receiving funds from Title III, ESEA. Three school districts were involved: Burlington, a small rural community in East Central Kansas; Independence, a medium-sized town in South Central Kansas; and Shawnee Mission, a large urban area surrounding Kansas City, Kansas. (Diagram I)

SHAWNEE MISSION
TOPEKA
BURLINGTON
POP 2,500
WICHITA
INDEPENDENCE
POP 15,000
KSC
PITTSBURG

During Year One, the Project received funds of $148,000.00 for seventh and eighth grade curriculum development. Approximately one third of the initial year's funds were allocated for equipment for the five junior high schools involved. The junior high schools were: Independence Junior High, Burlington Schools (one shop for both junior and senior high programs), and the Shawnee Mission Junior Highs of Old Mission, Indian Hills, and Trailridge.

Year Two was aimed at developing ninth and tenth grade curricula, while Year Three proposed to develop eleventh and twelfth grade programs. (Diagram II)

The S.E.T. Project was the first Title III project in the state to implement an accountability model as set forth by USOE. The components of the model and their effects upon the Project are discussed later in this presentation.

The need for the developmental work was accentuated when the State Department of Vocational Education proposed a State Industrial Education Model to be followed by school districts seeking vocational funding approvals. In Kansas, industrial arts falls under the Vocational Education Department, specifically in the area called industrial education. The Kansas State Model for Industrial Education (Diagram III) further emphasized the need for comprehensive and systematic 7-12 curricula in order to achieve maximum learner development in industrial education classes. The model provided a great impetus to the S.E.T. Project teachers' development and continues to inspire trial curriculum which is not only relevant, but is also practical to various school situations.

The Project is monitored by an advisory council, including industrial/business representatives and educators from throughout Kansas.

The impetus provided by Project goals, the State Vocational Model for Industrial Education, the industry/business advisory council, and the accountability phases of the Project has led to systematic curriculum development by the teachers involved. The

SECONDARY EXPLORATION TECHNOLOGY

TITLE III - ESEA
INDEPENDENCE - BURLINGTON - SHAWNEE MISSION

YEAR I (1971-72) $148,097.00

Summer 71 -- IN-SERVICE WORKSHOP FOR 10
TEACHERS AT K.S.C.
7th & 8th -- CURRICULUM DEVELOPMENT

YEAR II (1972-73) $140,900.00

Summer 72 -- IN-SERVICE WORKSHOP

9th & 10th-- CURRICULUM DEVELOPMENT

YEAR III (1973-74) $90,080.00

Summer 73 -- IN-SERVICE WORKSHOP

11th & 12th- CURRICULUM DEVELOPMENT

DIAGRAM II

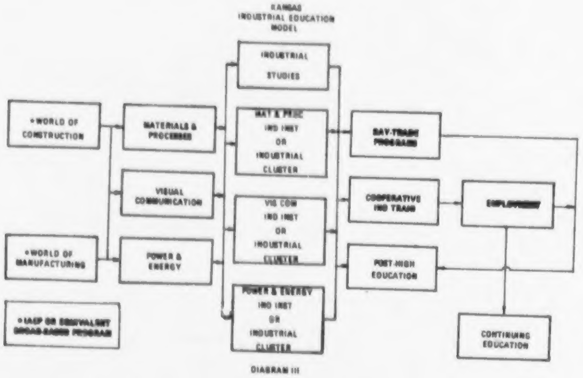

KANSAS
INDUSTRIAL EDUCATION
MODEL
INDUSTRIAL STUDIES
*WORLD OF CONSTRUCTION
MATERIALS & PROCESSES
MAT & PROC IND INST OR INDUSTRIAL CLUSTER
DAY-TRADE PROGRAMS
VISUAL COMMUNICATION
VIS COM IND INST OR INDUSTRIAL CLUSTER
COOPERATIVE IND TRAIN
EMPLOYMENT
*WORLD OF MANUFACTURING
POWER & ENERGY
POST-HIGH EDUCATION
*IACP OR EQUIVALENT BROAD-BASED PROGRAM
POWER & ENERGY IND INST OR INDUSTRIAL CLUSTER
CONTINUING EDUCATION

DIAGRAM III

systematic curriculum developmental procedure followed by the teachers may be capsulized in this diagram. (Diagram IV)

Diagram Explanation:

– The goals for industrial arts as delineated by AVA and AIAA were reviewed and decisions made concerning the goals appropriate to the 7-12 developmental effort.

– The objectives for industrial arts industrial education were delineated for 7-12 developmental effort. The area was defined.

– The total body of knowledge was graphically displayed.

– The goals for the specific area of development were delineated.

– Performance objectives were delineated in the three domains.

– Process objectives were delineated RE: the performance objectives.

– Terms were defined.

– Content was outlined per model situation and per school district involved.

– Activities were delineated to achieve all of above.

With the background information presented, a look now at what has been done in seventh and eighth grade programs, what is being done in ninth and tenth grade classes, and what is proposed for eleventh and twelfth grade classes will follow.

The 1971 in-service six-week summer workshop included the seven industrial arts teachers from the five previously noted junior high schools, plus representatives from the three high schools which were to be involved during the 1972-73 school year.

Due to the major impact that the IACP curriculum was having on the State Department

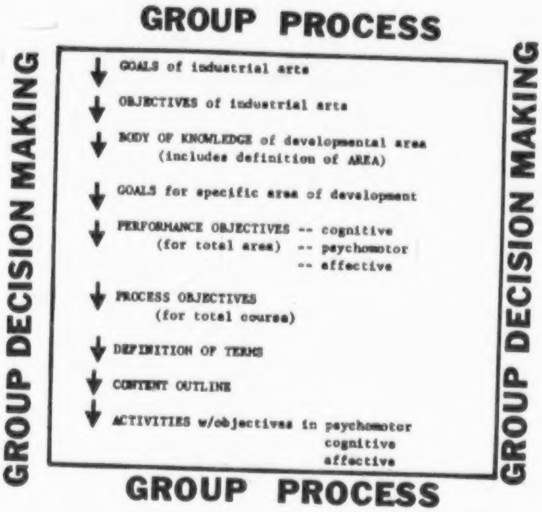

GROUP PROCESS
GROUP DECISION MAKING
GOALS of industrial arts
OBJECTIVES of industrial arts
BODY OF KNOWLEDGE of developmental area
(includes definition of AREA)
GOALS for specific area of development
PERFORMANCE OBJECTIVES -- cognitive
(for total area) -- psychomotor
-- affective
PROCESS OBJECTIVES
(for total course)
DEFINITION OF TERMS
CONTENT OUTLINE
ACTIVITIES w/objectives in psychomotor
cognitive
affective
GROUP DECISION MAKING
GROUP PROCESS

DIAGRAM IV

of Vocational Education at the time of the Project's inception (Diagram III), two of the S.E.T. teachers chose to use uncut versions of the material as developed. However, the remaining five junior high teachers chose to adapt the IACP material, incorporating various other ideas into their broad-based total system programs. Scheduling and facility constraints were reasons cited by the five who chose self-developed broad-based total system programs.

A unique aspect of all S.E.T. developmental efforts has been the method by which teachers have selected their trial curricula. All development has evolved through group process and group decision-making techniques. At no time has the staff of the S.E.T. Project dictated 'ivory tower' curricula for the teachers to implement.

Possibly the statement by Gellerman that "the ultimate purpose of any individual is to be himself. The basic motivation is to make the self-concept real, that is, to live in a manner appropriate to one's preferred rank, and to be rewarded in a manner that reflects one's estimate of his own abilities" (1) best describes the Project staff's feelings about curriculum development. This attitude is further exemplified in the curriculum developed by the teachers for their students. This will be noted later in this speech.

A synthesis by the seventh and eighth grade teachers was held following first-year trial efforts. What did the junior high S.E.T. teachers say about seventh and eighth grade programs during the workshop held at Kansas State College of Pittsburg? They said such things as (2):

1. The rationale as developed by the IACP is well organized and useable for development of various broad-based total system approaches.

2. Conceptual systematic approach to the study of industry at grades seven and eight (and in some instances grade nine) is far superior to traditional, project-oriented, junior high programs.

3. Operating expenses are not appreciably greater for IACP-type broad-based total system program implementation. Costs are justifiable.

4. Teachers must be well organized for maximum success in IACP and/or broad-based total system programs.

5. Broad-based total system approaches are readily accepted by community, administrators, other teachers, and students.

6. (They said other things – information available on request from Project office.)

All S.E.T. developers were involved in either a direct or an indirect way in selecting tenable alternatives for 9-12 programs.

Following the State Vocational Model, the Project teachers developed ninth and tenth grade programs in communication technology, power, and materials processes. Referring back to the systematic curriculum development procedure, the teachers were given specific objectives to complete during the 1972 summer developmental (9-10) workshops. The group process was the method through which the specific objective requirements were attained.

As a result of the summer workship, trial documents were developed in the three broad areas of communication technology, power, and material processes. Current indications are that the classes are most successful and student enthusiasm is high.

Before explanation is made of eleventh and twelfth proposed developmental work, a brief description of the accountability model involved in the Project and how it functions is presented.

Accountability, according to Webster, is "a charge for which one is responsible or accountable."

John Fierer, in the April 1972 Industrial Education Magazine, says that "Industrial education cannot long exist while lying accountable to no one." (3) However, Mr. Fierer implies that physical facilities, instructional materials, and other resources would allow an industrial education teacher to be accountable. We contend, in the S.E.T. Project, that accountability is much more than the items as noted by Fierer.

The S.E.T. Project incorporates accountability in the following manner (Diagram V):

ACCOUNTABILITY
in the
S. E. T. PROJECT

DEFINITION: Accountability has to do with assuming responsibility for THE DEGREE TO WHICH GOALS AND OBJECTIVES DERIVED FROM IDENTIFIABLE NEEDS ARE ACHIEVED.

GOALS AND OBJECTIVES

- Community Involvement
- Technical Assistance
- Needs Assessment
- Change Strategies
- Performance Objectives
- Staff Development
- Comprehensive Evaluation
- Program Audit

DIAGRAM #V

1. Community Involvement: Since the inception of the Project, community groups have been involved through open-house affairs, news accounts of the Project, opinionnaires concerning children involved in Project, etc.

2. Technical Assistance: Recommendations by educators from throughout the United States, by classroom teachers, by State Department of Vocational Educational personnel, by industry, business, and labor leaders, have provided tremendous help in the project's over-all development.

3. Needs Assessment: The original Project proposal was written around the identified educational needs of the State of Kansas.

4. Change Strategies: Inclusion of group decision-making processes has allowed for systematic development and revisions.

5. Performance Objectives: Each trial document was developed around specific performance and process objectives. Furthermore, the total Project evaluation document includes 31 performance objectives to be attained during Year Two of the Project and 23 process objectives for Year Two completion.

6. Staff Development: The Project teachers and staff have been involved in more than 18 weeks of concentrated development, revision, and synthesis sessions. The sessions represent approximately 7,560 man-hours of concentrated Project work.

7. Comprehensive Evaluation: Approximately 6% of the Project budget is expended on evaluation. Year One data is available through the Project office.

8. Program Audit: Dr. Daniel Householder serves as the Project auditor. His work includes assessment of evaluation procedures and evaluation designs. Periodic checks in depth on evaluation implementation is also completed by Dr. Householder.

The second year included the accountability components plus a very thorough evaluation design. Year Two evaluation was designed by EPIC Diversified Systems of Tucson, Arizona (4), and implemented by an outside evaluator. The components of the evaluation design are (Diagram VI):

EVALUATION
of the
S.E.T. Project
1972-73

COMPONENTS:

- #1. CURRICULUM DEVELOPMENT
  - 7 Performance Objectives
  - 6 Process Objectives
- #2. INSTRUCTIONAL
  - 22 Performance Objectives
  - 5 Process Objectives
- #3. DISSEMINATION
  - 5 Process Objectives
- #4. COMMUNITY INFORMATION
  - 1 Performance Objectives
  - 4 Process Objectives
- #5. INDUSTRY/BUSINESS
  - 1 Performance Objectives
  - 3 Process Objectives

DIAGRAM VI

1. Curriculum Development Component: Includes seven performance objectives and six process objectives.

An example of a performance objective in the Curriculum Development Component is: "At the close of 1972 Summer Curriculum Development Workshop, second year participants from Project schools will respond positively to the content of the Curriculum Development Workshop as measured by attaining an average 10% or greater gain (based on average possible gain) between pre- and post-administration of the S.E.T. Teacher Attitude Inventory."

2. Instructional Component: Includes 22 performance objectives and five process objectives.

An example of a performance objective in the instructional component is: "Upon exiting the Project S.E.T. instructional program for the 1972-73 school year, students will respond positively toward self as measured by a significant increase (.05 level) in positive response between pre- and post-testing on the S.E.T. Student Attitude Inventory—Attitude Toward Self items."

3. Dissemination Component: Includes five process objectives.

An example of a process objective in the Dissemination Component is: "By October 1, 1972, the Project Director will release the completed curriculum materials, including instrumentation, for the junior high program: Introduction to Technology—Manufacturing and Construction to the Kansas State ESEA Title III office and to the Director of Industrial Education, Department of Vocational Education."

4. Community Information Component: Includes one performance objective and four process objectives.

An example of a performance objective in the Community Information Component is: "By March 1973, community members in the participating districts will respond positively to the Project S.E.T. program as measured by a random selection of community members demonstrating an average 70% positive response on the Project S.E.T. Community Attitude Inventory."

5. Industry/Business Component: Includes one performance objective and three process objectives.

An example of a performance objective in the Industry/Business Component is: "By February 1973, industrial and business community members will respond positively to the Project S.E.T. program as measured by a sample of the industrial and business community demonstrating an average 80% positive response on the Project S.E.T. Business/Community Attitude Inventory."

Accountability as described above and as implemented in the S.E.T. Project proves to be a management tool. It also proves to be a very effective measure of learner gain and transportability of Project curricula to other schools. As Fierer so aptly puts it, "Whether we like it or not, accountability will become more and more of a factor in all future programs." (3) I agree and wholeheartedly endorse it as a viable technique for maximum educational experiences for all students. I reiterate that accountability is more than physical facilities — it is a total system.

The S.E.T. teachers in the 1972-73 developmental workshops saw the dire need for an accountable 7-12 industrial education curriculum, a curriculum adaptable to all sizes of schools with individually unique scheduling and facility arrangements. They further realized the uniqueness of the prime educational target, the learner.

With these realizations came the return of the questions:

Should industrial arts teach skills?
Should industrial arts teach knowledge?
Should industrial arts teach attitudes?

The S.E.T. teachers chose to teach all three. Bloom's Taxonomy of the Cognitive and Affective Domains (5) was selected as the rule for the "Know" and "Feel" domains. Dave's work in the psychomotor domain (6) was selected for the skills domain. (Diagram VII)

The ninth and tenth trial curriculum documents included specific objectives in each domain. However, the total model of the domains and the percentages of objectives therein was not concocted until recently. Diagram VIII depicts the model and its functional components. Another dimension of the model has been developed to depict the total career education system but is not presented here. (Explanation of the S.E.T. Model of industrial education objectives.)

Objectives related to broad-based conceptual programs (seventh, eighth, and ninth grades) in the three school districts are concerned most with the learners' cognitive domain as indicated in the diagram in the cognitive portion of the seventh, eighth, and ninth grade delineations. There are certainly many psychomotor-type activities and relationships made to ecology, etc. However, the psychomotor and affective domains are less emphasized in course objectives.

The ninth and tenth developmental efforts emphasized the psychomotor and affective domains in much greater degrees than broad-based programs, as indicated by the diagram.

In answer to the inevitable question, do students build projects in the ninth grade classes? Yes. They also mass-produce products, use individual contracts, do group and team work. The objective for the activity determines the type of product. This theory also applies to seventh and eighth grade curricula, although the programs are more lock step.

The above comments concerning activities basically are the same for trial efforts in the tenth grade classes. However, it is quite feasible that synthesis of ninth and tenth programs during the S.E.T. 1973 summer workshop will include the tenth grade in eleventh and twelfth developmental efforts.

What then is proposed for eleventh and twelfth grade programs in the S.E.T. Project? For 50-plus years, industrial arts teachers have utilized the now-popular individualized instruction technique. Developers of conceptual programs take away the individualization of industrial arts. Therefore, the S.E.T. teachers selected a model (Diagram VIII) which allows industrial arts teachers to further individualize their instruction while at the same time allowing learners to develop competencies which are measurable and are salable. This idea is earth-shattering to those who promote industrial arts as only general education. It also could rock vocational educators. Yet, those results are not planned and will,

COGNITIVE LEVELS
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation

AFFECTIVE LEVELS
Receive
Respond
Value
Organization
Characterization

PSYCHOMOTOR LEVELS
Imitation
Manipulation
Precision
Articulation
Naturalization

DIAGRAM VII

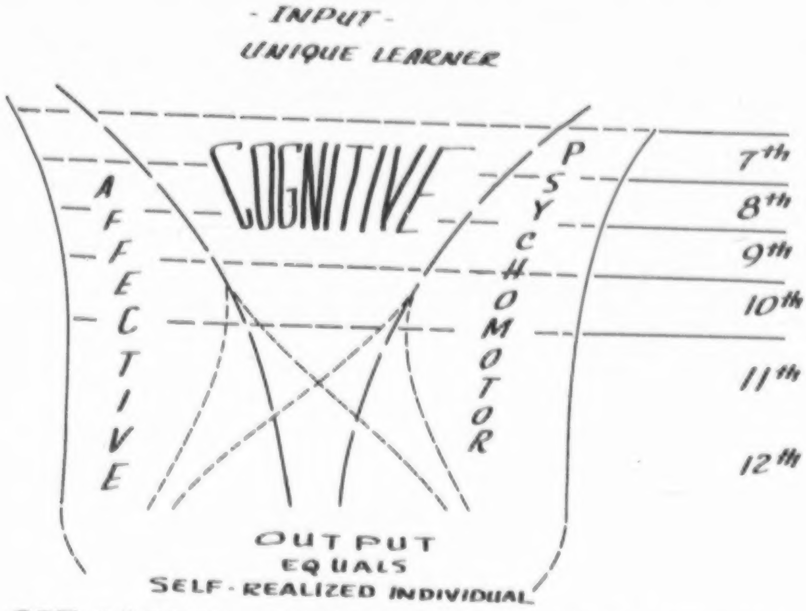
hopefully, not occur.

The S.E.T. teachers propose to utilize performance-based instruction in eleventh and twelfth grade classes of specific communication technology areas, specific power areas, and in specific materials processes areas not only to develop the cognitive domain and psychomotor domains but also to develop and make aware to the learner the importance of the affective domain. Industry tells us that nine out of ten workers are dismissed not for inability to do, nor for not knowing about but for their inability to get along with co-workers or problems of a similar affective nature. Yet, most industrial arts teachers spend their time in the cognitive and psychomotor domain in developing the learner. Admittedly, the industrial arts teachers are effecting learners affectively, while not realizing it.

Now what does performance-based instruction mean? Isn't that also a lock-step class setting?

Yes, to a degree, a part of an eleventh and/or twelfth grade program could and even should be lock-step. However, a major part of the eleventh and twelfth grades could conceivably be spent in activities allowed/designed/or promoted by the teacher to develop the students' affective domain. The lock-step aspect of the program will aim at skills, knowledge, and attitudes necessary for success by the learner in more difficult assignments or in job situations he may face upon completion of high school. The breakout of the major funnel part of Diagram VIII into several smaller funnels is representative of student choice, student trial, etc. Hopefully, when the affective has more fully matured, the learner will accept more appropriate and more meaningful psychomotor and cognitive choices.

Diagram VIII should help explain the rationale for industrial education's total commitment to develop the learner in all domains. It further justifies performance-based



S.E.T. MODEL of OBJECTIVE PERCENTAGES

DIAGRAM VIII

instruction and individual project selection/development.

What does all of this say for others in industrial arts and/or industrial education?

1. There can and should be a 7-12 industrial education program identifiable in an accountable method – i.e., teacher break-out of objectives in psychomotor, affective, and cognitive domains for programs and for specific activities.

2. The learner likes to know, do, and have feelings about – but the teacher must know why, know how, and make aware reasons for, prior to learner requests.

3. Teacher objectives for programs and learners in grades seven through nine should relate to systems and the whole of things. Activities reinforce the learner's cognitive development.

4. The learner in 10-12 likes to do relevant things. He likes to know why he is doing and furthermore likes to be measured (psychomotor and cognitive) so that he will know what he knows and how well he can do. More importantly, the learner likes to succeed and feel good about himself. Some call it pride in workmanship. Others call it positive attitudes. Whatever one calls it – industry is looking for it. Looking for it (pride in work and positive attitudes) more than skills and knowledge!

A Review of Project S.E.T.

1. A three-year project (Title III, ESEA) aimed at a total industrial education program 7-12 using small, medium, and large-size school districts in Kansas.

2. Embodies accountability components, industry/business advisory council, and 16 industrial arts vocational education teachers, plus a staff of two.

3. The S.E.T. model for objectives includes the three domains and proposes for industrial arts a decreasing percentage of cognitive objectives in higher grades as psychomotor and/or affective objectives become more prominent.

4. Industry tells us – send us workers with good attitudes, pride in workmanship, and some minimal skills and we'll further his psychomotor skills in accordance with our needs and his desires.

In answer to my original question—"What is the role of industrial arts in the full development of the learner?" I propose to you that industrial arts teachers utilize team effort in developing a learner from entry into program until exit from program. The S.E.T. model for objectives allows the teacher to capitalize upon his competencies while strengthening overlooked learner needs; i.e., affective domain.

NOTE:

A few copies of seventh and eighth grade synthesis documents are available upon request from the S.E.T. Project office. A 20-minute slide/cassette tape about the Project is also available upon request from the Project office: S.E.T. Project, c/o School of Technology, Kansas State College, Pittsburg, Kansas 66762.

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Manning Your Plant in the Era of Changing Technology

Earl Sundeen

Edward Carman III

C. Eugene Strandberg

I know that you are all aware of the changes that are taking place in our industry. There's no denying the inroads offset lithography has made on letterpress. We have all seen the old Miehle vertical shoved into the back room. Sure, it's still running as reliably as ever, but the four-color offset job is our pride and joy. It's the one we show visitors. In a single generation we have seen hand-set type give way to machine-set type, and that in turn to phototype, and finally to the computer printout.

We're living in an era of vast change. A constantly and rapidly increasing population that defies the cries of the ecologists has brought with it a need for better communication and that, in the end, means print on paper. Of course there is radio and there is television, but as powerful as these two media are in influencing people, they lack the permanency and depth of the printed word and the printed picture. We need books and magazines, we need packages to contain our products, we need forms to run our businesses.

All of this means that we in the printing business are facing the greatest opportunity we have ever enjoyed.

We worry about our image with young people who are schooling themselves for the future. We say that not enough of the right kinds of youngsters are being attracted to the graphic arts courses the schools offer. Backing up that worry is another question: Are the schools really preparing young people for the kind of job opportunities that now exist and which the future will bring in the graphic arts industry?

We think that we can offer young people greater opportunities than we have ever been able to offer them . . . but do we really know what these opportunities are ourselves? Are we selling ourselves to them as we should be? Will we need more people in the future in areas most of us have not yet even fully explored? Are we training management people who will be able to cope with the new technologies and the new demands that will be made of the graphic arts?

We asked these questions, and nobody knew the answers.

There were all kinds of surveys that told us how many offset presses were being installed, how many printing establishments there were, and how many people they employed, how many printers were printing from hot metal, how many were switching to offset, and how many from offset to letterset.

But that wasn't enough. Those were nuts and bolts answers, facts about machines that could do nothing without the people to run them, to maintain them, and to sell their output.

These were the questions that led us to initiate the Kodak Graphic Arts Industry Manpower Study.

Most simply stated, its purpose was to define the manpower needs of the graphic arts industry for the decade of the 1970's.

Actually, the survey, as it was finally formulated, had a dual objective:

1. To study the graphic arts industry itself to ascertain the current status of its labor force.
2. To evaluate and project manpower requirements for the decade of the 1970's.

Special emphasis was placed on defining the areas in which people will be needed as well as the required knowledge and skills of our future workforce. The study did not attempt to predict the numbers of people that will be needed by the industry.

The manpower study was divided into three parts: a personnel inventory and survey of printers; a technological forecast; and a survey of manufacturers.

The personnel survey was designed to provide a description of the current manpower force and the employment practices of the industry, to identify some trends in manpower growth and in the need for people in the industry.

The Technological Forecast, now called the Summary Survey of Graphic Arts Technology, was designed to summarize the present status of graphic arts technology by each of the major individual production areas common to the industry and to identify technological trends for the 1970's by each production area.

The third part, which we called the Survey of Manufacturers, was intended to determine those equipment areas where new products have been introduced in the last three years that appeared to have implications for manpower change.

Throughout most of 1971, suggestions and advice from representatives of 20 graphic arts associations, unions, and technical and educational societies supporting the study were analyzed and collated by the five-man study team in an effort to build the most effective and relevant survey possible and to develop the questionnaires needed to obtain the maximum amount of information. In addition, the printing and publishing industries division of the U.S. Department of Commerce also assisted in the construction of the survey. Both employer and union organizations were actively and wholeheartedly involved in helping in the construction of the survey forms and in support of the project.

This is a questionnaire, sent out to 5,000 printers, which sought information on the current status of employees and trends in manpower need. You may have received one and, I hope, answered it. The 5,000 printers selected represented a sampling of a cross section of the entire graphic arts industry and were selected by size of plant according to number of employees, by geographical location, by major industry classification — such as in-plant printers, commercial printers, newspaper printers — and by printing processes. Every effort was made to obtain a fair sample. Several major industry associations cooperated in helping us mail to the printers selected in the sample.

We received answers from slightly over 1,000, an excellent return by any direct mail criterion. If you think that was not a significant figure, I might remind you that presidential candidates and national policies are often determined by samplings of 1,400 voters out of the entire voting population of the United States. The front page of this survey asked some questions about the amount of production time spent in each industry classification, the percentage of production time in each printing process, and a number of questions about the skilled personnel in the plant, the hours worked, training programs, specialists employed, the sales and management staffs.

The back of the form covered some in-depth questions about the work force, problems in hiring and keeping trained personnel, and desirable characteristics of people in each job classification.

The manufacturers' survey attempted to determine what new equipment was being manufactured and whether demand was growing or lessening for the type of equipment, as well as the need for added operational and maintenance personnel.

It also attempted to determine the degree and type of technical knowledge required for the operation of this new equipment. This survey was sent to all companies in the United States producing printing equipment, approximately 150. Forty-four companies responded to the survey – an excellent return.

The Technological Forecast was conducted by the Graphic Arts Research Center at the Rochester Institute of Technology and was compiled from existing data – we did not ask RIT to duplicate the many other studies of technology already available. We did ask that they use these studies as the source of their summarization, based on the answers to our questionnaire. It is obvious that the direction of graphic arts technology may be the most significant factor in predicting manpower changes in the industry.

Now I would like to introduce you to the people who assisted Kodak in this study and have served for the last two years as our manpower project staff, helping to formulate questions and to translate answers into manpower needs. But first I want to tell you briefly why they were selected. All have strong backgrounds in research methods and procedures used in this study. They are thoroughly grounded in graphic arts technology and several have had plant experience. They were also selected individually as representatives of key geographical sections of the country. Perhaps most importantly, they were selected because of the status they enjoyed with educators in the graphic arts field.

Our early investigations designed to evaluate existing manpower information revealed that there was very little data available on the industry's needs for people nationally.

At that point we called on Dr. Gene Strandberg of Eastern Illinois University to join us in looking at the problem more closely. He proposed that a national study of graphic arts industry manpower be conducted. He has acted as project coordinator since the study was initiated early in 1971.

The project staff with which he has worked is made up of Dr. Page Crouch of Clemson University, who has done manpower analysis work in the Southeast working with the Printing Industry of the Carolinas; Dr. Ervin Dennis of Stout State University at Menomonie, Wisconsin, Professor of the Department of Graphic Communications; Dr. David Morrill, who not too long ago was the 3M Company Fellow within the TAGA-Education Council Fellowship Program when he was working toward a doctorate at Texas A & M. Dave now teaches graphic arts at the University of Maine; Dr. Zeke Prust, who has advised on local graphic arts manpower studies of graduate students from his position as professor of the Graphic Communications Department at Arizona State University.

Our company's liaison director for this study was Bill Flack. Now with Professional and Finishing Markets, Bill was on the staff of Kodak's Professional, Commercial, and Industrial Division for over six years. His major responsibility during those years was to work with teachers of graphic arts and photography at all educational and training levels. Prior to that time, he had had extensive experience in the study of both manpower and educational needs in the graphic arts fields, working on the staff of the Graphic Arts Technical Foundation and the Education Council of the Graphic Arts Industry.

Before we start taking a look at the findings of this study I'd like to make just one more point. We at Kodak believe that this study is just a start. We answered many questions and in the process uncovered many more questions that need to be asked. It is now up to you to use the data and conclusions resulting from this first study, to stimulate further studies for closer analysis of manpower needs, and to work with schools in creating needed change.

The results of this study verify most of the things that many of us have been suspecting for some time. Now, for the first time in the history of our industry, we have begun to evaluate our needs for people on a national basis – and for the first time we have data to carry to our schools and training centers to help them build the kinds of programs that will more accurately prepare the people that you need.

PROFILE OF AN OPPORTUNITY

We are approaching, in fact we are in the midst of, an era of almost unlimited opportunity for the graphic arts industry, but at the same time we are experiencing new manpower requirements.

When we advertise for help, our ads are saying the same old things. We are asking for experienced pressmen, lithographers, and bindery help . . . but are we really expressing our needs in these ads?

While some continue to say that there will always be a place for the old-time craftsman, it is now obvious that his place is giving way to people with strong technical backgrounds in electronics, chemistry, photography, and computer science. Manpower is now moving from the era of craftsmanship to a new science-based orientation. Brand new job opportunities are being created for those with an understanding of the contributions that printing science makes to the communication processes.

As a background for an analysis of the industry's manpower needs, we took an overall look at the industry and the areas in which it was changing. Our survey turned out to be representative of the industry as a whole, according to data published by both associations and the government.

In looking at our survey respondents by size, 47% had one to nine employees, 29% had ten to 25 people, and 23% reported employing 26 or more.

As would be expected, the majority of the companies reporting were engaged in commercial printing. The second highest category, though, was in in-plant printing departments which, as most of us recognize, have been increasing steadily during the last few years, largely due to the needs of business and industry for faster communications. Thirteen percent of the respondents were classified as newspaper/commercial; 14% were classified as trade plants providing composition, plates, and similar services to the industry; 10% as book publishers; 15% as printers of business forms; 4% greeting cards; and 6% packaging. The other 9% covered a wide number of areas.

The interesting fact is that most of the printers in these categories showed an increase in the volume of work they turned out, with only a minor percentage reporting a decrease. Forty-three percent of in-plant printers reported an increase; only 11% a decrease. Of those reporting in the general commercial area, 41% reported an increase; 15% a decrease. Among newspaper printers, 36% reported an increase, while 17% decreased. In the trade plant area, 42% said their workload was up, 20% that it had decreased. Fifty-four percent of the book publishers reported an increase, with 14% reporting a decrease. Forty-two percent of the forms printers reported an increase; 12% a decrease. Twenty-two percent of the printers of greeting cards reported an increase; 19% a decrease.

The increased demand for product packaging was shown by the 48% of printers who reported an increase in business during the last 3-year period, with only 7% admitting a decrease. I might point out that we are talking about increases and decreases here based on the three-year period starting in January of 1968.

When we start breaking down the categories in terms of the processes employed for all of the different kinds of printing, the results are extremely interesting and informative, particularly in their relation to manpower requirements.

It should be no surprise to anyone that the number of establishments reporting the greatest percentage of their time devoted to offset lithography exceeded the total of all others. Seventy-one percent of those responding to the survey reported doing some offset work, 46% letterpress, 2% gravure, 3% screen, 2% flexography, 2% letterset, and 4% electrostatic.

When you break these figures down and examine the increases and decreases in the different categories, the figures assume even more significance. For example, of those responding as doing some offset printing, 58% reported an increase in the production time devoted to it, while only 7% reported a decrease. On the other hand, those who said they did letterpress work reported a decrease of 53%, and only 16% reported an increase. All the other processes reported substantial increases.

The survey of manufacturers of equipment confirmed the preceding figures. Seventy-four percent reported producing some equipment for offset lithography, 7% for letterset, 5% for electrostatic, and 18% for other processes. Eighty-three percent of offset manufacturers increased their production time for offset equipment, while only 6% decreased it. In the letterpress area, 26% of letterpress manufacturers increased their production time, while 53% reported a decrease.

Among manufacturers marketing equipment to the various industry classifications, 67% of manufacturers marketing equipment to in-plant increased sales, while only 3% decreased; 68% of manufacturers who marketed equipment to general commercial increased sales, while 6% decreased.

These growth figures tell us that there will be an accelerating need for new people in all areas of offset lithography to operate and maintain the new equipment that is being developed and installed today. Secondary needs for new people will exist in gravure, screen process, and flexography.

Offset, of course, is still in its ascendency. As industry members who answered our surveys pointed out, its spectacular growth in the sixties will almost certainly continue through the seventies. The Technological Forecast which was put together for us by RIT quotes industry sources as stating: "Equipment manufacturers have responded with the development of better systems for offset, while relatively few continue to look for new ideas in letterpress equipment." The printing industry in general has embraced offset as a versatile and profitable process, and the most adventurous printers are attempting to apply offset to new markets daily. The compatability of the offset plate for photo composition and its rapid preparation, together with the fact that offset is suitable for printing on such a wide variety of materials, has played the major role in putting it where it is today.

Somewhere today there is a young man filling in an application for advanced schooling. He may be considering a graphic arts education because in high school he worked on the school newspaper or he ran a small offset press. But, ask yourself, what have you done to interest him in pursuing his interest in the graphic arts. Is he really the kind of person you will need in the future? Will the school program in which he is enrolling provide him with the kind of background that you need? When he graduates, what sort of a job can you offer him, what kind of opportunity? Will you be prepared to continue his training on the job? What are you doing to upgrade your present employees to meet the more demanding needs of today and tomorrow? The Kodak Study has revealed industry-wide answers to some of these questions. Only you can determine how your plant fits into the national profile.

These are questions concerning people, and we have to remember that it is people, not machines, that make a business successful. People are the industry's most important resource. In the survey a series of questions were asked concerning employing and holding people. In hiring personnel for skilled occupations, the number one problem was the shortage of qualified applicants. The problem second in importance was related—poor trade knowledge and skill. The third most important problem was the inability to offer an adequate wage.

In the retention of skilled people, poor work habits and attitudes had the greatest significance, although knowledge and skills and inadequate wage scales were also identifiable factors. Inability to get along and inability to adapt seemed of little importance.

When asked about the desired education level for some 20 production areas common to the graphic arts, respondents overwhelmingly selected the general high school level over vocational education. Perhaps this indicates a failure of the more advanced vocational-technical educational programs to meet the special needs of the graphic arts industry. Since creating an interest in the world of work is fundamental to industrial arts education at the general high school level, it appears that such introductory studies of the graphic arts industry have served the industry well in the past and will continue to do so in the future.

The industry should, however, be using specialized vocational-technical education programs to better advantage as a source of new people.

When asked about desirable characteristics in the retention of people on the job, 43% of the employers ranked attitude and work habits first, while dependability was ranked second, ambition and initiative third. The industry did not appear to be interested in promotion potential, even though they were interested in many of the factors that appear to comprise that potential.

One of the ways of learning, of course, is through horizontal mobility within the plant, the ability to move from one job to another, as for instance, from platemaker to pressman. In general, the larger companies offer less mobility between production areas, while the smaller plants provide more.

We also asked about vertical mobility or the opportunity for upward advancement in a single area. Forty-one percent of the respondents stated that vertical movement opportunities existed, but 59% admitted there was little such opportunity. Here the larger plants seemed to offer greater opportunity for vertical advancement. In general, the industry wants people who have good attitudes and work habits, who are dependable, who have ambition and initiative. At the same time, the industry provides little promotion potential or mobility in the plant. This position must be re-evaluated if the industry is to attract the capable people that it needs.

Retraining also offers both an opportunity for advancement and change to the employee and a means of allowing printers to accept newer technologies because of an available, trained work force. Yet 39% of the companies did not participate in retraining programs at all. Of the 61% who provide for retraining, nearly one-half of the training is done by companies, 18% by educational institutions, and only 17% by unions. There is a tendency for union training to increase as the company size increases, as many of the smaller organizations are, of course, not unionized.

These figures underline one of the major problems in the industry which was uncovered by the manpower study. Of the 61% who provided retraining, 45%, or nearly one-half, stated that it was provided by the company. Since only 5.5% indicate that they employ anyone who is an education specialist, this means that most in-plant training is on a one-to-one informal basis. Further, one of the largest problems cited in terms of retaining people on the job is inadequate knowledge and skill. This would seem to indicate a grave weakness in the present one-to-one on-the-job training system that most companies employ. With the new skills and technological expertise required to handle new processes and new equipment, it is also obvious that a serious gap exists in the plant which wishes to advance its own men to the new and more demanding jobs. What industry needs to do, and must do, is to develop cooperative training and retraining programs with schools and training centers which will result in adequate preparation of the people it needs now and in the future.

We found specialists employed in the industry who were estimators, production and quality control people, safety experts, environmental and labor relations specialists, computer experts, and others. Interestingly, medium-size plants invest more in estimating and production control specialists than either large or small plants. In general, as plants grow in size and because the majority do not now employ specialists, it was concluded that there will be an accelerating demand for specialists in all areas of printing production.

In view of new and tougher governmental regulations in the areas of safety and environment, it was surprising that few companies employ specialists in these areas. Only 5% of the companies surveyed had someone who specialized in safety practices. Only 2% said that they had a specialist in environmental work on their payroll.

Safety, of course, is a vital factor in any business, and especially in the graphic arts. Lack of attention to adequate safety precautions can bring about even more stringent government regulations and penalties and can increase production costs with lost-time accidents. Considering these factors, the industry must spend more time on plant safety. In the larger plant, a safety specialist might well be a profitable investment.

The same holds true in the environmental area. As the graphic arts industry well knows, both federal and state authorities and civic-minded local groups are taking ever closer looks at industries and their waste disposal practices. By and large, the graphic arts industry has a good recent record. The Graphic Arts Technical Foundation and other groups have been working on the problem and passing their findings on to the industry. With the increasing public sensitivity to the ecology, it might be well for individual graphic arts plants to study their needs for specialists in this area.

With the growth of offset as well as other processes has come a new need for additional people in the pre-press areas, including layout and design, photo composition, paste-up and copy preparation, camera, stripping, and offset platemaking. This area showed the greatest gain in the number of people in individual departments. The average gain by department for pre-press and offset areas was 1.25 people since 1968. The average gain for all other production areas together was .78. The average gain for letterpress-related areas was only .10.

The printers' survey has also shown that the need for technical knowledge has increased in nearly all production areas over the last three years. Generally, the most significant increases took place in pre-press and offset related areas. Many manufacturers also reported an increasing need for such knowledge, not only for operators of the equipment, but for those who will maintain it.

In the area of camera, 79% of the printers responding to the survey indicated an increase in technical knowledge requirements. This was the highest percentage increase in all the production areas.

Thus we see that there is a major shift toward the requirement for greater technical knowledge in the handling of most printing equipment. This was further emphasized when we consulted the manufacturers of the equipment which will be used. Many reported that the equipment which they have marketed during the last three years will require more people and more highly trained people both to operate it and to maintain it.

For camera operation, 69% of the camera manufacturers reported a need for added people in this area. Twenty-five percent of manufacturers in the stripping field reported a need for an increased number of stripping operators as a result of new equipment they have placed on the market. In offset platemaking, 47% of the manufacturers serving this market indicated an increased need for operators. Forty-six percent of manufacturers of offset sheet equipment suggested an increasing need for offset sheet-fed pressmen to operate new press equipment.

Manufacturers indicated the need for increased knowledge in electronics, mechanics, photography, chemistry, and mathematics for new equipment being produced in nearly all areas, but especially in the offset-related areas.

There is a need to develop people with a substantial foundation in photography, electronics, math, and chemistry if there are to be enough knowledgeable people to handle the graphic arts equipment of the future. Certainly in the future, you will wish to select new people with stronger backgrounds in the sciences than those whom you may have selected in the past.

Based on the answers to our survey and the assemblage of facts and figures we have been able to put together, we have tried to give you a realistic summary of some of the recruitment, employment, and retention problems illustrated by the study and conclusions drawn for action on your part. Some employment and retention problems will be solved by you through effective selection and job training and retraining programs. Some of the recruitment and education problems must be solved by the schools; in this case, we expect that educators, as a result of this study, will be revamping courses to meet the needs of the industry better. Some jobs, as they always have been, will be filled through the recruitment of workers from other organizations. But by and large, you are going to need more people, more skilled people, and people with increased technical knowledge, which means that you will need people with substantial preparation in effective graphic arts education programs.

Other sources, all of which are much in the news these days, exist among women, minorities, former military people, and the physically handicapped. Of those who reported success with special-group hiring, the majority were the larger companies. Women apparently have had greater success in our industry than any other special group.

The success of almost any company depends upon the ability of those who are selling its goods or services. We asked the industry where it had been getting its sales people and found that the largest percentage came from within the company, while the next largest percentage came from other companies, and a still smaller percentage from community or technical colleges.

We also asked what difficulties have been experienced in hiring sales people, and what we found was interesting indeed. Fifty-nine percent reported that their No. 1 difficulty in hiring new sales people was a shortage of qualified applicants, 31% indicated poor knowledge and ability, and only 8% placed the blame on wage scale as an employment problem.

When it comes to keeping salesmen on the payroll, the principal reason for their departure was the obvious one, that they couldn't sell. Inadequacy of their pay jumped from its low point in the hiring scale to the second largest problem here, although it wasn't close to the inadequate sales ability problem. The response to this question suggests that in addition to re-examining sales education programs, the industry's selection procedure for salesmen, including available aptitude and ability tests, should be reanalyzed.

Finding good management people seems to be equally difficult, with a shortage of qualified applicants reported by 65% of the respondents. Poor knowledge and ability and inadequate wage scale ranked about evenly as employment problems of management personnel.

When it comes to keeping the man at the top on the job, his failure in 52% of the cases was due to his lack of management ability. The second most critical problem was an inadequate wage scale, particularly in the smaller companies. Related to his lack of management ability was his inability to work with the skilled employees and a general inability to get along with his co-workers. Once again, both preparation and selection techniques for managerial employees need to be re-evaluated.

While the colleges and universities appear to have the greatest potential for supplying the new people you need for both sales and management jobs, the industry rated them as only a secondary source. At the same time, over 75% of the respondents said that a college or university background was desired for their management people. These responses imply that while the industry wants managers with college background, it is most interested in people with experience. It is concluded that this experience factor, coupled with the shortage of people, dictates that industry and education must develop cooperative work study programs for new management personnel. The industry must open its doors to interns from the schools, even though these interns may not make immediate contributions to production and marketing goals.

I would like to suggest at this point that you take a walk through your plant when you return home, taking particular note of those areas that today require people with special skills or abilities. This includes the designer in the pre-press area, paste-up people, cameramen, strippers, and platemakers.

These jobs are all going to become increasingly important to the industry because they are increasingly fundamental to all processes. You are going to need more people here, people whose worth to you will be immeasurably more if they can come to you with skills that have been developed to match your needs. Older employees will need to be retrained in these specialties if your productivity and profits are to increase.

The industry is also facing new technologies, changing methods of reproduction, new materials, and new equipment creating manpower needs that only can be met through the development of new and different education and training programs.

These programs must stress primarily the areas of technical knowledge which underlie all of the contemporary graphic arts processes, providing understandings which are common to a great variety of the new and developing technologies. Common areas of technical knowledge include those fundamental areas already defined: photography, electronics, mathematics, and chemistry. People prepared in such programs will be better able to adapt to change on the job, to new pieces of equipment and new developments as they come along.

Our manpower project staff has made some general recommendations for changes in the education programs which were presented to the International Graphic Arts Education Association Conference. We recommended that, while all types of printing and printing processes should be explored, special emphasis should be placed by schools on developing people for employment in both the in-plant and general commercial industries, with equally special emphasis on the offset lithographic process.

At that time we made additional recommendations, and we plan to continue making these recommendations to all graphic arts educators at all levels of education, throughout the United States, during the next few months.

First, it is recommended that new people in increased numbers be prepared for both production and managerial opportunities in the graphic arts industry of the 1970's, especially in those technical growth areas defined by the study.

Two . . . that educational programs place increased emphasis on developing an interest in the graphic arts industry among students.

Three . . . that the type of educational program to be developed which will be of most benefit to both the industry and the student at the secondary level would be a broad industrial arts program designed to explore the technology which underlies the graphic arts and to determine and develop interests in these areas. These programs should stress the development of good work habits and attitudes, dependability, and ambition.

Four . . . that graphic arts education programs at all levels shift their emphasis as required to areas of layout and design, photo composition, paste-up and copy preparation, camera, stripping, offset platemaking, offset presswork, and bindery. Any continued development of knowledge and skills in letterpress printing is not consistent with the contemporary needs of the graphic arts industry.

Five . . . that instructional programs place additional emphasis on developing technical knowledge in the science-oriented areas which increasingly provide the foundation of graphic arts technology.

Six . . . that young people being guided into the industry be advised to consider employment in smaller graphic arts companies where they might obtain a broader aspect of graphic arts technology and in larger companies when they are more interested in in-depth specialization.

Seven . . . that additional cooperative industry-education training and retraining programs be developed.

Eight . . . that college and university programs expand their efforts in developing sales and management personnel for the industry, with emphasis on providing work experience during their education process.

Nine... that community colleges, colleges, and universities develop the areas of safety and environment as integral parts of their graphic arts curricula. It is also recommended that curricula at the college level include some instruction in the application of computers to graphic arts technology and management.

And, that colleges with graphic arts management programs consider offering continuing education programs for their graduates, with emphasis on technological growth and development.

At the start of this program we told you of Kodak's objectives in this study; we have given you a lot of facts and figures, and some general conclusions. At this point, a summary review of the major conclusions of the study is in order to help provide a clear picture of the conclusions drawn for manpower from this study.

First, the most significant need for manpower in our industry in the 1970's is and will continue to be in offset lithography, with secondary needs in gravure and screen-process printing.

Because of the nature of the growing processes including offset, gravure, and screen process, there will be a continually-accelerating demand for qualified employees in the pre-press areas essential to all of these processes, including layout and design, paste-up, and copy preparation.

There will be a definite need for increased numbers of camera operators, for strippers, for personnel to handle phototypesetting equipment, platemakers, and press operators.

Although letterpress is still widely used, its use appears to be declining at an accelerating rate, and there will be little need for new people in this area.

There will be a need for more people to handle plate and press functions in screen process printing, gravure, and flexography.

There is a substantial need and will continue to be a need for able and experienced sales people and for management personnel with sound managerial training who are attuned to both the needs of their people and the directions and applications of new technologies in the graphic communications industry.

Stated most generally, job opportunities in graphic communications are substantial and are expected to increase at an accelerated pace during the rest of the 70's.

With this situation prevailing, the individual company must seriously consider the efforts it is making in retaining or holding the people now on its payroll. The industry must make its jobs more attractive, with more vertical and horizontal mobility and greater potential for promotion.

There is a great need to develop on-going continuing education and retraining programs in the industry. Since most training programs are of the on-the-job one-to-one variety which do not appear to be meeting the needs of industry, greater efforts must be made to create new and more effective training activities. Special or minority groups should be more strongly considered for employment in the graphic arts.

The industry should work with the schools in initiating beginning and continuing education programs for sales personnel. Special emphasis should be placed on marketing techniques and job experience as part of the curriculum.

Universities, trade associations, unions, and management organizations should consider development of special programs to bring present managers up to date in those areas unique to graphic arts management, including personnel development and the technological advances that they must understand.

The information presented here is like the tip of an iceberg. All of the data and conclusions will be published by the trade press and in special Kodak publications. The complete report will include all data compiled, survey instruments, all tables and graphs, study conclusions, and recommendations.

A second publication is called "Manpower for Graphic Communications... A Time for Change." It is designed for use by both industry and education, and features the conclusions of the study and recommendations for new education programs. This publication includes suggested curriculum for the schools designed to prepare the kinds of people required by the industry as defined by this study. Recommendations for instructional laboratories — including equipment and layout — are also included in this publication.

The results of the manpower study verify most of the things that many of us have been suspecting for some time. The most important point is that now, for the first time in the history of the industry, you have data at your fingertips which can be carried to your local schools and training centers to develop education and training programs that will really meet your needs. It's now up to you to work with educators and trainers toward the cooperative development of your most important resource — manpower.

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Technology and the Elementary School Student

Robert D. Weber

It is a pleasure for me to speak to you today regarding two topics which I judge to be both old and new, conventional and experimental, static but yet dynamic. The first topic, and probably the most important one, is the elementary school student. Close behind is the second topic, technology. Are these two topics somehow related? The title of this presentation implies that the topics are related, but there are some questions which might be raised concerning the relationship. For instance, why even bother to study about technology in the early years of education? Isn't the elementary school curriculum already overcrowded with subjects? How can we possibly add another subject called "technology" which many people cannot even define, let alone teach? An even more fundamental question is whether a study of technology can actually serve the purposes of education, including the needs of each individual child. Really now, aren't children too young to engage in technological activities? Certainly this in itself would pose a serious safety hazard.

By the way, assuming that you have convincing answers to most of these questions, where are you going to find the competent teachers capable of managing technological activities in the classroom? Will he or she be able to deal with the phenomenal explosion of technological knowledge without going into some type of future shock?

Perhaps at this point, it might be wise to end our question period and use the remaining time trying to find some answers to the questions posed. If logical answers are not forthcoming, then perhaps the relationship between the two topics, children and technology, does not exist.

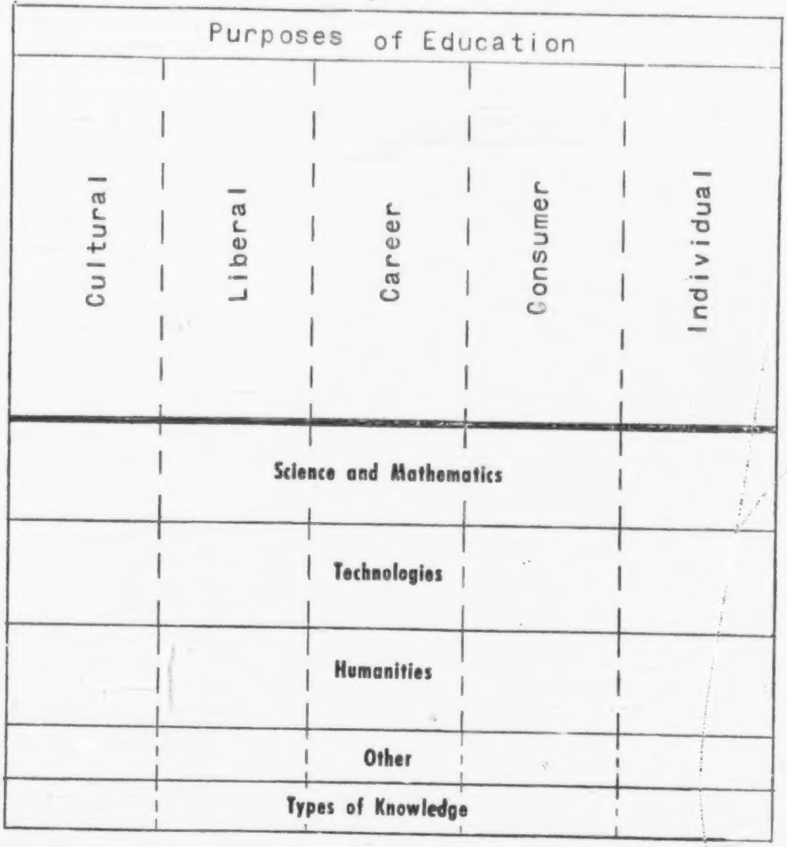
Where do we start in defense of the relationship? Maybe the best way would be to get a handhold on the meaning of technology. Once this is done, it might be easier to relate the topic of technology to the elementary school student.

At best, technology is difficult to define. Unanimous agreement upon a definition of technology would be difficult to obtain. However, for the purposes of this presentation, an acceptable definition of technology is offered by Kranzberg and Pursell. (1, p.4) They define technology as man's efforts to control his environment. Both writers feel that man controls his environment by using available resources in a creative manner. Undoubtedly, early man depended very heavily on all the technology he could muster. It was simply a question of survival. Compared with other animals, early man was not very well equipped to deal with his environment, let alone control it. He could not hear very well, run very fast, see very well, or even threaten other animals with strong-arm techniques. In order to survive, man had an obvious need to extend his physical capabilities via tools and creative thinking. His technology was directed at obtaining basic needs such as food, clothing, shelter, and security. Indeed, early man with his primitive technology spent many long hours obtaining basic things which we now take for granted.

Today, twentieth century man uses a rather complex technology to meet most of his primary needs. Besides being complex, the technology is fast, efficient, and to some extent unappreciated and unknown. Undoubtedly, technological man will continue to control and shape the environment. My hope is that man will begin to use more creativity and less of the available resources in order to insure the existence of an environment worth controlling.

At this point, we might begin to see a need for schools at all levels to consider the area of technology as a viable subject for study. Perhaps by examining the role of the

Figure 1.



school we can show more clearly the value of studying man's efforts to control his environment. Figure 1, which I have modified slightly from the writing of Lux (2, p.310) will help illustrate how the study of man's technologies supports the purposes of education. The upper portion of the diagram represents some purposes of education, while the lower portion illustrates knowledge categories. Technology is represented as a knowledge along with science, mathematics, and the humanities. Typically, mathematics and science help us to understand and order our environment. The humanities help us to understand ourselves and our relationship with others. Technology, which was previously defined as man's efforts to control his environment, is a knowledge of doing. For example, if man wishes to control a river by constructing a dam, certain procedures or technological actions will be performed to insure a functional, well-constructed dam.

If we can accept the purposes of education which appear in the diagram, we can then show the value of technological study in accomplishing these purposes. Consider first the cultural purpose. How has man's technology developed? How has man progressed from a self-sufficient society to a society dependent upon technological production? Why not study and experience primitive ways of producing such things as food, clothing, and shelter, and then contrast this technology with present-day technology? To realize the technological accomplishments of past generations can lead not only to appreciation but also to an inspiration to improve upon those accomplishments.

The liberal purpose of education attempts to free the mind and prepare the student for the unending task of solving life problems. The ability to think critically, identify problems, try solutions, and in some cases try, try again, are key elements in this area. Technology by its very nature requires the application of critical thinking and problem-solving skills. However, these skills are not applied in a vacuum. Tools and materials are used to solve concrete problems, and frequently the student is able to judge immediately how successful he was in solving a particular problem.

Little needs to be said about the relationship between technology and careers except that the relationship is important and unique. The wise teacher who organizes technological activities around such things as building, transporting, manufacturing, and communicating will also include introductory information about the people who use these technologies. A case in point is a first-grade class which decided to construct an outdoor storage area for recreational equipment. First an architect helped the children draw up a building plan. Actual construction of the shed occurred on successive Saturdays with help from the local mason, carpenter, roofer, and electrician. Hopefully, through this experience, the children learned something about community helpers. Undoubtedly they grasped the concept of careful planning coupled with a specific procedure to be followed in construction of the shed.

Since we are no longer self-sufficient, we must depend upon technology for both products and services. If we are to be wise consumers of these products and services, it seems important to distinguish the good from the bad. Technological knowledge of how things are produced and serviced can certainly aid the consumer in the decision-making process. The decision to support the construction of a highway or nuclear generating station can only be wisely made when both the positive and negative effects of man's technology are understood and contrasted.

Finally, the last purpose of education, and perhaps the most important one, deals with meeting individual needs. Most people might not equate technology with this particular purpose. But if we treat technology as doing or knowing how to do, it then becomes an excellent vehicle for meeting individual needs. Children are by nature curious. They want to investigate and manipulate. They are interested in learning and achieving. They have a need to be successful, to be recognized, and to belong. Deprived of these needs, children gradually develop a negative self-concept of themselves which may inhibit them throughout life. Because technological activities deal with concrete things, children find learning easier. Dale (3, p. 98) notes that direct first-hand experiences form the bedrock of all educational experiences. In discussing Piaget's writings, Elkind (4, p. 47) notes that "our teaching at the elementary school level is generally much too verbal and abstract because we have been misled by the children's verbal prowess. Throughout the elementary school years, children need to concretize their language by relating words to things. The child's natural propensity in this regard is obvious from his penchant for collecting things and for making and doing."

Using tools and materials to study the technology of building, transporting, food processing, and communicating takes advantage of the child's need to be active, explore, and investigate. As children work in a technological environment, there are many chances for achievement and recognition. Children learn that they must cooperate and help each other with tools while sharing materials. The judgment that technology assists children in meeting their needs and functioning well in social situations is perhaps the strongest reason for including it in the school program.

In summary of our discussion relating educational purposes to a study of technology, perhaps we can agree upon two things. First, technology is and will continue to be a dominant force shaping our environment. Secondly, a study of technology provides a unique way for students to begin to satisfy the purposes of education. If this agreement is forthcoming, then where are all the programs in school which bring children and technology together? One thing is obvious; there is a scarcity of programs, especially in light of the rationale proposed in this paper. Rather than be critical of what you and I have failed to do, perhaps we should look at the track record of a successful program. Consider the New Jersey Technology For Children Program in grades K-6. In 1966, the program was instituted with approximately 25 elementary school teachers. Today, in 1973, there are over 1500 teachers involved with the project. Although number of teachers involved is not the best criterion for judging success, it does indicate the willingness of elementary administrators to allocate both teachers and funds for program adaptation. The initial and continued success of the Technology For Children Project (T4C) might be attributed to some or all of the factors listed below:

1. From the outset, the program has focused on the individual needs of children. Technological activities have been used as a vehicle for allowing children to explore, manipulate, cooperate, and be recognized. Emphasis is not put on the vast knowledge of technology but on the interests and needs of the learner within a technological environment.
2. The classroom teacher is responsible for managing the technological activities. The teacher not only becomes reasonably skilled in the use of tools and materials, but also decides whether T4C will be a separate subject or integrated into the existing curriculum. This approach recognizes that two different people can use different methods to arrive at the same goal.
3. Teachers wishing to adapt T4C to their particular situation receive training in both the philosophical and technical aspects of the program. The local school system is committed to support the program by providing operating funds and time off for periodic T4C conferences.
4. Project staff operating through the State Department of Education provide organizational and technical assistance to beginning and established T4C teachers.

Undoubtedly, most of these procedures have facilitated the change process. Hopefully they will be valuable to you when you begin to develop your own program.

In conclusion, it seems fair to state that there is a close relationship between technology, children, education, and learning. Technological activities not only support the purposes for which the schools exist, but they also assist the individual in his or her total development. As the learner explores, investigates, and manipulates, he learns something about himself, other people, and the things he is working with. Perhaps this type of learning is the kind Edgar Dale (5, p. 42) was referring to when he said, "The learning that is of most worth enables us to get a sense of individual and social identity — who we are, what we care about, and what we can do."

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URBAN CRISIS

The Environment in an Urban Society

Robert W. Armbrust

The Man/Urbanization/Technology equation may be thought of as a catastrophe when viewed from the standpoint of natural earth systems, since a catastrophe may be thought of as an event which upsets the usual order of things. Man first started overturning the natural order on a small scale when he developed agriculture and animal husbandry. His later development of a written language and the rise of city states further upset the balanced ecology. The more recent proliferation of metropolitan centers of manufacturing and commerce has hastened degradation of the environment to the point of crisis – some are of the belief we are fast approaching an ecological doomsday.

Perhaps we can most meaningfully think of urbanization as the evolutionary movement of man from his relatively simple hunter-fisherman life, to that of family-centered crafts, and ultimately to factory worker, businessman, and professional. Man's inborn inquisitiveness, coupled with his delight in adventure and his developing capacity for rational and creative thought, started him along the path of technological innovation.

It was exhilarating, indeed, to meet nature's challenges head-on and to sense the slow but steady gain in control over circumstances which had seemed so harsh – even cruel. And it must have seemed so right, so natural and normal – almost as if it were expected of him. Why else did he possess this wonderful brain capable of such powers of rationalization, and such creativity, whose depths he had only begun to plumb, and whose achievements seemed to him at times to challenge nature's best. Perhaps it was understandable, therefore, that he should slowly come to lose his perspective, become dulled in his humility with the passage of time, and increasingly come to view himself as apart from nature, aloof, and independent – himself a creator of his own environment! But as the poet writes, all dreams must end, all fantasies fade before the beneficent sunlight.

OUR MAN-MADE ENVIRONMENT

Can man fashion the environment in his own image? Can he depend solely upon his own intelligence to safely and unerringly guide him through the subtle mazes and pitfalls, can he continue to violate the bold patterns and laws of the larger food, water, and air systems of which he is both part and partaker? Our natural scientists caution us that we are embarked on a dangerous journey indeed, and our psychologists point to increasing signs of alienation and estrangement – despite living several thousand persons to the urban square mile!

Man, amazingly flexible and adaptable, seemed at first to thrive in his vibrant, new-found productive environment. More recently, however, psychologists became convinced that human behavior was determined by the circumstances of the environment, and the urban environment grew with little planning to reflect human needs and values. Many writers feel that man saw only the advantages of urbanization – and these seemed to the poor their only hope – but that he failed to understand or accept the full consequences arising out of its complexities.

Urbanization has now progressed to the point where sociologists no longer recognize any meaningful distinction between urban and rural. While differences in population densities may exist for some time, differences in mode of life are seen as rapidly disappearing. As urbanization moves rapidly through successive stages of "urban sprawl" into the "megalopolis" era, it finds itself involved in what is not inappropriately termed "the urban crisis." While neither the intent nor purpose of this paper is to explore this crisis, it encompasses a highly dynamic mix of social, political, philosophical, psychological, and ethnic factors, in addition to the environmental and pollution factors which are the major concern of this paper.

OUR EXPLODING POPULATION

Demographers estimate that for a million years before the Christian era, world population could not have increased at a greater average annual rate than perhaps three hundred persons. This rate has steadily increased to an annual average of twenty-seven million for the period 1925-1962. Future predictions are for an additional billion people by 1975, and another billion by 1982. World population has thus more than tripled since the early 19th century. Possible psychological effects of existence in an unnatural, overflowing world, without privacy, quiet, or independence, triggers thoughts of the famous lemming migrations, now said to be the result of the intolerable effects of crowding on their simple brains. It is predicted that food production will be able to support population growth for an indefinite period—if taste, smell, and appearance are of no consequence. As a consequence, zero population growth (ZPG) is being strongly advocated by many. It is estimated that in order to achieve a ZPG in the U.S., a rate of 2.1 children per family for the next 170 years would be required, based on a population of 320 million.

OUR CARELESSNESS AND IGNORANCE

Erosion

Sediment represents one of our largest water pollutants, but more importantly, it represents the rather suicidal loss of a link in man's food production chain. We cannot continue, on the one hand, to place ever-increasing demands upon the soil for foodstuffs, while on the other hand permitting soil to be lost forever through erosion; nor can we hope to survive any millenia-long wait while new soil is being formed and enriched by organic matter.

Land undergoing urbanization is our greatest source of sediment. Research reveals that construction sites contribute sediment at rates approaching 20 to 40,000 times those of farms and woodlands. Under present construction practices, it is not uncommon for such land to remain bare and exposed to erosion for three months to more than a year. At one construction site consisting of 89 homes on a 20-acre site in Maryland, 3,800 tons of soil eroded—equivalent to a 1-1/4-inch layer over the entire area. One storm alone removed more than 256 tons in less than two hours.

The irony of these affronts to nature is that control technology does exist in the form of such practices as selecting the best construction season, reducing area and duration of exposure, mulching and vegetation, mechanically retarding rates of storm runoff, and trapping of the sediment. Laws and zoning regulations are sorely needed requiring that contracts contain sediment-control provisions to protect owners, society, and nature. We annually spend 125 million dollars to dredge some 38 million cubic yards of sediment from our harbors and waterways—enough, we are told, to fill almost two million railroad cars! Meanwhile we lose more than 100 million dollars in reservoir capacities, and for each pound of municipal and industrial waste we dump into our rivers, lakes, and streams, erosion usually adds several pounds of sediment.

Fertilizers and Pesticides

In order to achieve higher food productivity and foods free of insect damage, modern farming has become dependent upon a variety of chemicals, fertilizers, and pesticides. Their use has become standard procedure in food production, so much so that some 763 million pounds of 900 different pesticide chemicals are produced and used annually, primarily by agriculture, but also by industry and the home.

The death of many of our waterways throughout our major farming states is charged to nitrogen from chemical fertilizers leaching out into adjoining streams and rivers. This nitrogen accelerates the stream vegetation growth which, when decaying, robs the water of its oxygen content and ultimately renders a stream incapable of producing the oxygen needed to cleanse itself of organic matter. The Federal Environmental Pesticide Control Act of 1971 required that all pesticides be registered and designated as to their proper use as either general, restricted, or by-permit-only use. This act was enacted primarily in response to environmental contamination resulting from persistent use of pesticides, which had both affected the ecology and found its way back into man's food chain.

The President's Council on Environmental Quality reports that Integrated Pest Management offers new opportunities to reduce the use of chemical pesticides and aid the environment. These "natural" pest-control techniques include cultural methods, pest-specific diseases, resistant crop varieties, sterile insects, attractants, and releases of pest parasites or predators. Research is now underway to establish economic thresholds or levels at which pests can be tolerated without significant damage to crops. Although the public is often the last to hear it, findings show yields are heavier when little or no pesticides were used than when periodically used as precautionary applications.

Food Poisoning

Microbiological contaminations of canned foods have caused salmonellosis and staphyloccocus to become rather common, though much-dreaded, household words. Meanwhile, nutritionists warn us that nutritional quackery is being practiced on the uninformed and unwary public in the form of deceptive and misleading claims. The average person, for example, is estimated to consume from three to five pounds of chemical additives annually in his food, placed there reportedly to enhance color, taste, or smell, and to retard spoilage.

Lead Poisoning

Some 600,000 children in our urban areas suffer from lead poisoning, contracted by eating paint chips from houses, furniture, etc. In 1968, the U.S. used 5.6 million pounds of mercury, bringing the total usage since 1900 to 169 million pounds. The adult tolerance level has been set at 2 parts per million (PPM). Samples from the St. Clair River bottom ran as high as 2,000 PPM when this pollution hazard was first discovered.

AIR POLLUTION

For the year 1968, it is estimated that the U.S. had total airborne emissions of ten million tons, consisting primarily of carbon dioxide, particulates, sulfur oxides, hydrocarbons, and nitrogen oxides. Major contributors were cars, fuel combustion from stationary sources, industrial processes, solid waste disposal facilities, and miscellaneous sources such as forest fires and agricultural burning. Scientists tell us that the economic effect of air pollution in terms of damaged health, materials, and ecology is staggering, and that any money directed at abatement is, in every sense, just good logic.

Recent research into the effects of air pollution on plant growth have revealed that pollution reduced growth by as much as 40% or more. It is indeed an irony of our time and our urban culture that plants grown in a green-house with filtered air are healthier than those grown outdoors in the fresh air! Trees throughout the world are dying from the effects of air pollution, and smog, a more complex product of air pollution, has claimed untold lives in urban centers.

The short-term outlook is not especially bright for any improvement in air quality. Shortages of low-sulfur fuel are said to have been instrumental in forcing a delay of enforcement of proposed clean air standards for 1975. Tennessee Valley Authority, for example, is said to be unable to meet these standards, despite the present cost of cleaning up its stacks, which amounts to $125 per customer over a 15-year period. Auto manufacturers are also experiencing trouble meeting proposed standards, and enforcement officials are concerned lest the rather delicate catalytic-type emission controls become disfunctional and pose a number of attendant problems.

WATER POLLUTION

The effect of urbanization upon water quality has been no less tragic than that of air quality. While quantity has proven adequate in all but a few cases, the quality has slowly deteriorated. Urbanization's polluting effects are magnified by water's remarkable absorbency for salt, chemicals, acids, and even metals. An ever-present danger to our urban water is contamination of our underground resources. These are by far the major and most important part of our water resources, accounting for as much as 90% of our water resources, unpolluted, unsilted, and often untapped.

Industry withdraws water at the rate of 200 billion gallons per day, more than the average flow of the Mississippi River at Vicksburg, Miss. The latter represents the run-off of about 40% of the land area of the conterminous U.S. Fortunately, more than half of industry's water needs are met by reusing water. This is especially important, considering that as much as 184,000 gallons of water may be required to make a ton of fine book paper. About 80% of the industrial use for water is in electric power generation for cooling.

We command the technology to raise water relatively economically to clean and healthful levels. In only a few notable cases more expensive tertiary treatment, which is designed to remove nitrogen and phosphorus nutrients, has been required. Water from such expensive treatment will be, we are told, "too good to throw away," and will be directly reused for agricultural, industrial, recreational, or even drinking water supplies.

The Water Quality Act of 1965 was the first federal attempt to enhance the quality of

U.S. waters. The Clean Water Restoration Act of 1966 authorized appropriations for construction grants to help build sewage treatment plants, aid to state water pollution control programs, and monies for research into new ways to treat industrial wastes.

PRODIGIOUS CONVERSION OF RESOURCES TO WASTE PRODUCTS

Energy

Some thirty years ago, Buckminster Fuller reportedly calculated our total energy generated in the U.S. as equal to the muscular energy generated if every person had 153 of Crusoe's Man Friday. In terms of today's energy demand, every person — man, woman, and child — would have about 500 Man Fridays. Small wonder that we are variously described as the "energetic nation" or as "energy-drunkards." These descriptions painfully reflect our seemingly insatiable appetite for energy to fuel our ready-mix, throw-away, planned obsolescence, energy-grabbing way of life. And how shall we power the burgeoning pollution control equipment with which to clean up the waste and pollution our way of life produces? Why, with even more energy, of course!

Approximately 97% of our electrical and heating energy for our urban culture is obtained from fossil fuel — petroleum, natural gas, and coal. By 1985 we will have to import 40-55% of our total energy from abroad, possibly resulting in poor balance of payments, as well as other countries becoming large equity holders in the U.S. We are reported to have known oil reserves for only 65 years, gas for only 50 years, coal for perhaps 300 years, uranium for 25 years, and shale oil for 35 years. At present consumption rates, we have reserves for 200 years. Twenty-five percent of our present energy goes into electric power generation, a process only 30% efficient.

Solid Wastes

Solid wastes have become a major problem in urban society, if for no other reason than their sheer quantity. The quantity problem is compounded by the indestructability of many, the expense of collection, handling, and disposal, and their unsatisfactory storage. Their menace to health further compounds the problem. Complicating this rather dismal picture further are matters of political jurisdictions regarding collection, recycling or disposal, social attitudes in urban complexes, and the difficulty of gaining public support for their collection, recycling, or disposal.

While the recycling of paper, plastics, glass, metals, and other materials would seem an obvious answer to both preserving and protecting our material and energy resources against needless waste, the inherent problems of types and quantities required for efficient operation have slowed efforts. A number of urban centers have pilot programs or limited programs for paper, glass, or cans. Allentown, Pa., has a profit-making city-wide program for paper which is reported as achieving excellent cooperation and results.

The Glass Container Manufacturing Institute reports that Americans dispose of 11 million tons of glass annually. It is presently impractical to recycle this into new containers, due to the necessity to sort the glass for color before remelting, which would in turn require long hauling distances to recollect. Recycled glass is being utilized for several new building and construction products. Glass rubble building panels of 4-10 foot size and weighing up to 1900 lbs. each, costing from $1.50 to $3.00, are one such product.

Another recycled glass wool insulation product has a $10.00 per ton advantage over virgin material. Recycled glass is also being used for a type of terazzo flooring, as material for sewer pipe, and slurry to seal pavement. A recent Oregon law requiring that refunds be paid for beer and carbonated drink cans and bottles, although meeting with resistance from the beer and soft drink industries, is said to be an overwhelming success. Nearly all states are said to be watching Oregon's law and considering similar laws.

NOISE POLLUTION

Until the more recent stages of urbanization, man accepted noise as a normal accompaniment of bringing soil to proper tilth, planting and harvesting, forging and grinding a new tip on a tool, or building a barn or house. The advent of ever-more-powerful and sophisticated manufacturing, construction, and transportation equipment and vehicles has skyrocketed noise levels, and we are told that even today's kitchen has enough noise-producing appliances to almost challenge the proverbial boiler factory. Even noise in the modern operating room has reached levels where fear is being expressed for the patient's well-being. Traffic noise has also come to be a matter of concern in urban areas.

The Federal Occupational Safety and Health Act (OSHA) has already come to the rescue of noise-weary factory workers in the manufacturing industries with enforcement of standards for specific noise levels and duration. Urbanites and suburbanites, meanwhile, settle back to their daily routines with the noise of trains, trucks, autos, Hondas and Yamahas, sirens, mowers, rototillers, canned music, chimes, bells, and various portable electric tools for the shop, lawn, and garden.

THE NEED FOR NEW VALUES IN RESOURCE PLANNING AND MANAGEMENT

True Cost vs. Unit Cost

The American economic system has geared itself to serve *consumers*, rather than *humans*. Mechanization, automation, and cybernation in turn have produced vast quantities of consumer goods cheaply and efficiently, when viewed from a "*unit cost*" standpoint. But those who study the human condition tell us that all is not well, and despite our material abundance, the human psyche is impoverished and undernourished.

Environmentalists feel "unit costs" of production are in reality only rather deceptive short-term costs, reflecting only the familiar Man/Machine/Materials equation, while the *ultimate* costs, which reflect in addition any environmental "trade-offs," are the *true* costs. They would be quick to concede that, while the latter are much less tangible and perhaps even somewhat tractible, this does not subtract one iota from their validity. It should also be noted in passing that the psychologist, philosopher, and sociologist would also wish to add something, injecting a human element into the ultimate cost equation.

Ecological Trade-Offs

Some say we will have to make certain rather "practical trade-offs" in ecological areas, and that these must be arrived at through certain risk-to-benefit considerations. We are also told that we will have to settle for what is rather knowingly referred to as the "inevitability of some ecological impairment."

Environmental vs. Dollar Values

In such risk-to-benefit considerations, the value some would attach to a particular animal or plant species or to a particular eco-system is cause for apprehension or alarm. Must our decisions continue to be dollar-value based only? Must they reflect the egomaniacal philosophy expressed by the remark, "When you've seen one tree, you've seen them all"? Will man come to reflect both wisdom and humility, discerning that such affronts to nature are, in effect, affronts to himself — an inextricable part of nature's scheme, her inexorable laws, and her simple rhythms and order?

OUR APATHY

Perhaps our shame is that too few have the temerity to voice even mild concern over the need for exploration of short-term alternatives to practices which portend even greater proliferation of pollution control equipment and attendant soaring energy demands. As well indoctrinated consumers, we fear being viewed as "anti-progress" or simply not a part of the new society. Have no fears, the optimists tell us, cheap, clean nuclear energy is just around the corner, with its promise of exponential energy.

Many learned scientists, meanwhile, warn that nuclear energy is the dirtiest technology conceived by man, since its by-products have a half-life of some 20,000 years. Any major accident would be unthinkable in the experts' opinion, since the typical riverside location of plants would permit contamination to spread widely and rapidly. Documented accidents to date have fortunately been relatively minor, yet the death rate — especially for infants — has definitely reflected these accidents. That all-important link in man's survival chain, the fetus, is said to be four times as sensitive to radiation as an adult.

BETTER STEWARDSHIP

Throughout man's thinking and writing runs a common theme regarding his transiency and lack of any absolute possessions on earth. True, he has certain rights, the right to use the natural resources, but he also has attendant responsibilities to act as good steward in passing these on to the future inhabitants in the best condition he knows how. America's greatness has been attributed by many to the early influences of the challenge posed by ever-present new frontiers. Although the frontiers have long since vanished, much of our thinking and attitudes about land and unlimited resources, shaped under those pioneering and frontier conditions, seem to have persisted. If a farm became unproductive, you simply moved on to better land. The pioneer writers described the lands and forests as endless and abounding with game, the streams clear and teeming with fish, and the earth itself a treasury of minerals.

The federal government now provides assistance to enable states to protect land which they feel to be of critical environmental concern and where necessary to curb the incursion of airports and highways. Assistance is also being provided for land acquisition for parks and recreational areas for large urban populations. More and more urban areas have, or are developing, land-use policies which utilize zoning to preserve prime agricultural land. Rather than wait for the pressures posed by land developers and speculators, and the resulting escalating land values, some urban counties are now buying their surrounding farms to protect their food sources. The setting of optimum city size in keeping with environmental and human values is also being proposed.

A CHANGE IN FOOD HABITS

That old adage, "eating high on the hog," well describes urban America's food habits. Our beef-eating habits put us very high on nature's food chain. One 10-ounce steak is rated as equivalent to 17 days of food for less-fortunates on starvation diets. The average American thus places a four times heavier demand on the biosphere than if he lived like much of the world, mostly on grain. Fish and chicken, on the other hand, require only about 1/5 as much feed per pound of meat produced as does a steer. The feed-lot-finished steer of 1000 pounds will also require 20 to 24 months to raise. Nutritionists tell us that less beef eating would have important secondary effects in health improvement. Meanwhile, we are putting increasing stress upon the eco-systems in order to supply our demand for food.

THE NEED FOR RECYCLING INCENTIVES

In his 1971 Environmental Program, the President noted the need for additional research, policy studies, and analyses to provide new and alternative strategies for dealing with the whole spectrum of environmental problems. He cited especially the need for better understanding of how economic forces induce some forms of environmental degradation and how we can create and change economic incentives to improve rather than degrade environmental quality. In proportion to our total materials consumption, recycling is actually declining. The surest known way to reverse this trend is said to be the offering of financial incentives. Past government policies hampered recycling of some materials. These policies included taxing and other fiscal and regulatory policies which give a person using virgin materials a bonus or tax break. Notable examples of this are the freight transportation rates for iron ore which favor it over scrap iron. Oil developers are permitted the first 20¢ on the dollar untaxed, while used oil, which represents both a time and energy bank, is typically poured out to further pollute the land, water, and air. Labeling policies in certain sectors of the economy have been another source of discouragement to recycling. When aluminum producers came under fire recently, due to news that aluminum production required about 5 times the energy that is required for steel, they were quick to counter that the recycling energy costs were only about 5% of that required to make virgin aluminum. Aluminum has, they say, become an energy bank, which can be drawn upon again and again at little additional energy, assuming recycling is done. Smelters of aluminum insist aluminum cans are not suitable for ingots and cast aluminum items, due to the magnesium content, and that its reduction is prohibitively expensive.

THE NEED TO SLOW AND CONTROL POPULATION GROWTH

Environmentalists and demographers view with alarm the increasing world population and the resulting complexity of the population/food/environment equation. In the relatively short period of 15 years, from 1955 to 1970, the world population increased by one-third. By the year 2,000, it is estimated, there will remain as little as 1.2 acres of good crop land per person. Given our present eating habits and our present food production techniques, this would not adequately sustain the world population.

THE THREAT OF ECOPORNOGRAPHY

Ecopornography has recently appeared in the environmental literature, having as its roots the words ecology and pornography. The former's meaning is obvious, and the latter appears frequently in the news media. The two combined describe a type of writing on ecological matters which is, in a sense, obscene or offensive. All are aware of advertising's potential for abuse. We all grew up in an advertising-dominated culture, and on many occasions fell victim to its insidious appeals to vanity, greed, pleasure, prestige, etc. We have seen its power to increase consumer demand for products and services.

The objectives of ecopornography are to encourage or delude an already technology-bewitched and bewildered society, to be assured technology is solving the environmental problem. As one writer has noted, people want so much to be assured — and so it's back to the television set! Unfortunately, the ecopornographic message diverts the reader from a basic understanding of what is really going on, and this is its greatest danger; in addition, many do not possess the environmental awareness or the scientific knowledge to detect the many subtle half-truths, omissions, and deceptions they contain in the name of ecology. As someone once said, beware of half-truths — you may have hold of the wrong half.

And who shall champion the environment and pay the multi-million-dollar advertising cost to offset ecopornography and set the issues straight? The Federal Trade Commission and the Federal Communication Commission are the so-called "watch-dogs" of advertising. They can, within rather broadly-defined parameters, penalize parties found guilty of misleading or fraudulent advertising; in extreme cases, even require that equal or off-setting advertising be paid for.

SOME ENVIRONMENTAL ALTERNATIVES

Organic Farming

The implication of photosynthesis, as the only known non-polluting power, is only now being recognized. Chinese rice culture produces approximately 53.5 BTU for each BTU of human energy expended in farming it. Our highly-espoused agriculture, in contrast, produces approximately 1/5 BTU in the form of food energy for each unit of fossil fuel expended in plowing, cultivating, harvesting, and storing crops.

Our mechanized farms, where one man takes care of 60 to 75,000 chickens, or 5,000 feedlot cattle, or 50 to 60 milk cows, give the impression of tremendous efficiency. Yet we must realize this is made possible only because of the prodigious use of cheap fuel, both on the farm and in the urban factories, where many persons fabricate the farmer's support equipment. We are told that cheap energy is gone; we therefore need to look more thoughtfully to the possibilities of organic cultivation, which utilizes a greater proportion of free sun energy for the production of food. Hamburger-stand foods have an energy content representing about 1/10 of the energy expended to get it, while produce from your garden yields about 16 times more energy than that used in growing and cooking them.

Geo-Thermal Energy

Geo-thermal energy is receiving renewed interest as a relatively new and untapped supplement where geographical features make it feasible. This process utilizes water or steam, which has been heated by the hot magna layer deep within the earth, to drive electric generators. If hot water is used, disposal of the waste water poses a potential environmental hazard, due to possible pollution of streams or groundwater. The economic advantage predicted for 1975 is lower capital investment of about $100-$150 per KW as against $200-$300 per KW for coal or oil-burning generation, and $500 per KW for nuclear plants. Under a 1970 Act, the government leased federal land in 13 states having favorable sites for development of geo-thermal energy. It is estimated that 395 million KW of electricity may be available by this method by the year 2,000 — this represents present aggregate generating capacity.

Methane Gas

The potential for greater production of methane gas from sewage by-products is seen as a supplemental source of energy. This is not a new technique, but it has been applied only on a limited scale to date. We have enough human and animal wastes, we are told, to produce 2000 billion cubic feet of gas per year, which would augment our present 20,000 billion cubic feet of natural gas per year. But because the process depends upon nature's own time schedule of 40 days for the digestion of organic waste material by anerobic bacteria, it cannot economically compete with natural gas, which is composed of about 90% methane.

Substitute Natural Gas

The Federal Power Commission is studying an application to build a Substitute Natural Gas (SNG) plant with a 250 million cubic foot capacity in the Navajo Nation, New Mexico. This plant will consume 9.6 million tons of coal per year and require 44,000 acre-feet of water per year. SNG is obtained through the controlled reaction of coal and oxygen in the presence of excess steam in a suitable reactor. It is felt that oil companies are encouraged by their research findings on producing gas and liquid hydrocarbons from coal, which is our most abundant energy resource.

THE PRESIDENT CALLS FOR DEDICATION

In his 1971 Environmental Program, the President closed with this plea to Americans to dedicate themselves during the decade of the seventies to the goal of restoring the environment and reclaiming the earth for ourselves and our posterity. He then invited all people everywhere to join in this great endeavor, and closed by noting that together we hold this good earth in trust.

This paper has attempted to arouse a heightened awareness of threats to environmental quality posed by urbanization. In so doing, it has explored possible alternatives to present urban and technological practices and problems, and has posed a challenge to all to maintain and improve our mutual environment. Therefore this paper did not attempt a full development of those more positive aspects of man's technology which lightened the burden of his labors, freed him from famine and disease, and provided him the leisure to more fully explore the depth and breadth of his humanity.

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The Urban Society in Crisis: A Technological View

Nathan Weiss

Much has been written about the urban crisis. However, an aspect which I think has not been sufficiently addressed is that which concerns the technological implications of urban dysfunction. In addressing the technological linkage to the urban crisis, I will focus primarily upon four questions.

1. What are the symptoms of the contemporary crisis of urban society?
2. What role has the technological revolution played in creating the urban crisis?
3. What role shall technology play in the renewal of contemporary urban American society?
4. What role should technological education play in the renewal of contemporary American society?

First, let us turn to the question relating to the symptoms of the crisis in urban society. The symptoms can be categorized in an endless list. The highlights would have to begin with the collapse of the urban environment as exemplified by the pollution of the air, water, soil, food, animal and plant life, etc. Secondly, the immobilization of urban transportation should be noted and here the manifestations would include vast traffic congestion, the space imperialism of the insolent chariot (notably the automobile), and the inability of railroads, busses, and other forms of mass transport to operate with even a modicum of efficiency.

A third symptom which emerges concerns the collapse of security for persons and property. The reading of current newspapers should be sufficient evidence of the mounting crescendo of crime.

A fourth symptom would be the disarray of municipal services in areas such as garbage collection, strikes of municipal employees, and the horrendous unresponsiveness to human needs.

The collapse of health services is a fifth symptom, as evidenced by the rising rate of tuberculosis and other diseases of poverty among the urban poor.

The sixth symptom is reflected in the growing alienation of young workers who indicate their sense of anomie through work stoppages such as the recent Lordstown General Motors strike.

Finally, and by no means does this indicate an exhaustion of the catalogue of horrors, we see catastrophic deterioration of housing in the greater urban centers of America. The flight of the white middle class to the suburbs, followed by the influx of blacks and Puerto Ricans, the clashes between the tenants and landlords, the decline of the physical facilities, all these are signals of the growing distress of urban society.

Having categorized, at least in part, the symptoms, it is perhaps now appropriate to turn to the question of the technological revolution and the role it played in the creation of the urban crisis. If one would permit a brief review of the history of industrialization, it would be possible to note certain landmarks. These would include the development of new farming technology which made possible the agricultural revolution in the 18th and 19th century; the rise of industrialism in those countries which had conquered the problem of agricultural productivity; the spawning by industrialization of great urban centers, the giant corporations, trade unions, over-seas expansion, the medical revolution which prolonged life, and the rapid rise of living standards — all vast changes in modern society. Thus the technological revolution has resulted in both great blessings for humanity and severe dislocations, dislocations which are most significantly reflected in our urban centers today.

How shall we deal with the urban crisis in American society, particularly the technological aspects? Technology, it seems to me, must be utilized to restore the environment. Further, technology can be used to improve the quality and productivity of municipal services. The computer and the managerial techniques of the modern corporation have already demonstrated in areas such as trash disposal in the city of New York that it is possible to make dramatic improvements. It is ironic that, at a time when to many people New York City seems to be ungovernable, indications exist which show New York beginning, at least in a few areas, to get a foothold in the efforts to improve services.

Technology must be used to restore the sense of security for persons and property in the urban society. Health services certainly are promising candidates for technological use. Technology also can result not only in man's disaffection from work, but also can be employed positively to end the worker's alienation from his job. I would suggest to you that the notion of job enrichment and human development, both for blue collar and white collar workers, has much to offer. The list of possibilities that I have brought forth is by no means exhaustive.

Finally, we must address the question of the role that technological education should play in the renewal of urban society in America. Stress should be placed upon career education from kindergarten to graduate school; career and technological education should also be coupled with preparation in the behavioral sciences; technological and career education must increasingly stress access for women, blacks, Puerto Ricans, Chicanos, and native Americans; technological and career education must be articulated systematically from kindergarten to graduate school through regional, state, and national efforts. A national human power policy which assesses needs, changes, and futuristic projections should be utilized by educational planners.

In the final analysis, all of the issues which I have raised will come to naught unless there is active involvement in the political decision-making process by technological educators. Excellent plans are spawned daily, but most of them flounder on the rocks of inactivity. Vigorous political action is very much in order if we are to shape the destinies of our nation. Indeed, I would like to leave you with the thought of Edmund Burke, "All that is necessary for Evil to triumph is for good men to do nothing."

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Urban Complexities Spotlight an Industry's Need for Help

Clifford L. Elling

When one tries to unravel the intricate web of conflicts and problems which are a corollary development of our increasingly urbanized society, the construction industry is spotlighted in the crossfire of opposing goals and emotions in one area after another. No discussion of inner-city decay and urban renewal proceeds very far without a public debate concerning what should be torn down, what should replace it, what can be preserved, what can be restored. When we discuss pollution, not only the obvious forms of air and water but even in the areas of noise and transportation, the builder, the designer, and his skilled forces are once again needed to effect any possible improvement. Housing for the poor and the elderly are other areas of social change and concern which must ultimately involve some form of effort by our own industry.

We have been spotlighted in the public clamor over jobs and employment opportunities. A running dispute between the old-line craft unions and the desires and aspirations of our minority groups flared into open battle in many cities. Training programs for those in the urban ghettos together with a gradual and reluctant lowering of the barriers for union membership are succeeding in opening good job opportunities and a chance to become a skilled productive worker in those exact areas where such opportunities are scarcest and most needed because of the flight of business and commerce from decaying center cities. This often leaves a situation where demolition and reconstruction is the first necessary project before any other plan of economic and social betterment can even be put into action.

An increasingly important factor in today's sophisticated construction is the mechanical contractor. He is the man who provides the plumbing, heating, ventilating, air conditioning, service and process piping, power plants, and utilities which permit an urban culture to function. To cover such a broad variety of interrelated skills, we have adopted the term mechanical contractor. In the basic underlying sense, we are concerned with those portions of the construction industry which deal with moving parts.

Here again, we are on the cutting edge of another recent social phenomenon, the increasing frustration and disillusionment shared by our population with appliances that will not work, valves that stick, leaky pipes, loose parts, and the increasing impossibility of finding adequate, competent repairmen to keep our physical plant running smoothly. This frustration, together with planned obsolescence and the equally dubious tax law effects of the fast write-off, has created a situation where it is often cheaper to throw something away and replace it than to even try to keep it running efficiently. Thus we are gradually being inundated by our own growing piles of scrap and waste.

The construction industry as a whole represents more than 10% of our gross national product. Its output is approximately twice that of all domestic auto producers combined. We are far and away the largest single segment of the economy. Amazingly little is known about the details and operations of this economic giant, despite over-all size. We do not have any large, well-recognized units which dominate our industry; in fact, the largest single construction company represents less than 1% of the industry. Rather, we are dominated by tens-of-thousands of small companies, partnerships, and individuals. Their typical development has been along father-to-son lines. There is a strong tradition of family businesses.

Given such a fractionation of our industry, there is no single unit with the resources and financial strength to establish a training program, to develop standards of professionalism, or to even conduct a meaningful national public relations campaign to present our story and our problems to the people. We are one of the last strongholds of the individual entrepreneur, the generalist or jack-of-all trades working by himself and truly managing his own enterprise to a far greater extent than other supposedly independent business men such as auto agencies, shop keepers, and franchise holders. All of these, in varying degree, do have a large paternalistic corporation looking over their shoulder and guiding their day-to-day operations to the extent of telling them how to render a service, how to keep their books, how many men to employ, and even what prices to charge, let alone when to have a sale or how to decorate the premises.

Furthermore, there is a strong tradition of growing from skilled craftsman to a businessman. More than half of the construction contractors in this country work with their men and use tools at the jobsite each day. Those who are now larger often started this way, as a skilled journeyman. Even today, this is the largest single background for the members of the Mechanical Contractors Association of America.

It is in this area of recruiting future leadership that our industry is undergoing one of its most critical changes. Young people no longer obediently follow in their parents' footsteps. The craft unions have succeeded in raising their level of skill and training, income, and job satisfaction content to a level where fewer mechanics want to be contractors. Also, each activity now requires an increasingly divergent background.

Combining this change with the industry profile of comparatively small, weak units, lack of capital for management training, and no particular tradition of management professionalism, we have long been at a loss as to how to obtain key men for the management jobs in our organizations. There is no readily available training ground for purchasing agents, expediters, project managers and estimators, other than the old seat-of-the-pants method of learning by working alongside of a man who is already performing these functions.

What type of jobs are these? Who can best fill them? They are characterized by a wide-ranging area of interests and responsibilities. Keep in mind that we are an industry of tiny units; it is not surprising that even a substantial, well-established mechanical contractor will have no more than a dozen people in his office, fewer than six key executives. These men cannot be specialists, they must be generalists in the old tradition that has been largely abandoned by our schools. Where could we go to find men at home with a group of engineers, but also capable of holding their own on the fine points of labor relations, cash flow, and contract law?

The educational establishment has not been particularly concerned with training people for our industry. It is far more aware of the needs of our corporate industrial giants, large institutions such as government, and professional areas such as education itself. No one company was in a position to sponsor its own training efforts or even do an effective recruiting job. Under these circumstances, we had to band together through our trade associations and seek to interest someone in developing programs to meet our future needs. Through the Mechanical Contractors Association, we are working with the unions to train a new generation of more highly skilled mechanics, utilizing the Apprentice Training program. We are also conducting our own trade association educational programs to upgrade these skills of our existing management. Finally, and perhaps most important for our long-term future needs, we have turned to Newark State College and asked their help to formulate a 4-year degree program to train future professionals for the mechanical contracting industry.

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The Management and Utilization of Solid Waste—A Problem in the Urban Environment

James V. Bernardo

The theme of this conference, "Industrial Arts and the Challenge of an Urban Society," is indeed timely and worthy of our attention and very best efforts. For we live in a time of such rapid change that we seem to be numbed by it all. Scientific advancements and almost incredible technological developments are having a tremendous impact upon society. Yet, with all the new knowledge and all the available technology, we continue to be plagued by societal problems which are perplexing and at times frustrating. The cities, especially, pose grave and alarming problems – socially, economically, politically, and morally.

As always, when the nation faces a crisis, education is looked to as the great hope for solutions. Teachers are under great pressures. There are demands to do this, do that! Be innovative, be creative, be imaginative, be interesting, understanding, firm, loose, and fair. Be the fountain-head of knowledge and strive to generate greater student involvement. Use the process approach! Above all, try desperately, if over thirty, to close the generation gap, and to shape the class offerings so that there is relevance to the real world of work, play, pleasure, and strife. For that is what our young people want desperately – the real thing.

The protection of their environment is high on the list of their wants. At least this is so for large numbers of them who are issue-oriented, and despoiling our lakes, rivers, and the landscape is an issue they can grapple with.

Most of the attention, publicity, and group action in the past six or eight years has, however, centered on air and water pollution. The "third pollution," solid waste, has not come in for much attention except for the portion of it known as litter. Litter is indeed ugly and should be of great concern to all of us. But in a sense it is like the tip of an iceberg, highly visible, but a small part of the whole. We need to concentrate on the larger problem – that of municipal solid waste. It is what you and I throw into the garbage and trash cans each day. It has increased from 2.75 pounds per day per person in 1920 to 5.3 pounds in 1968. Presently we throw away close to 6 pounds for each man, woman, and child. Unless we can somehow stem the tide, it will go up to 8 or more pounds by 1980.

Not realized by most people, our municipal solid waste is the third largest expense of the average American city. It is behind only the expenses of schools and roads, and is ahead of welfare, believe it or not. Collecting solid waste is expensive at best, and transporting it and disposing of it are alarmingly costly, and besides rising costs, pose large problems. What do we do with it? The typical mode has been the open dump. You have all seen them, smoldering, smelling, and polluting the air for miles around. They are happy breeding grounds for rodents and vermin, and rain water leaches down to pollute the underground water supplies.

Even though laws are now beginning to close down these open dumps, at least 75% of all cities and towns are still using them. What are the alternatives?

With citizens more and more aroused over the unsanitary dump, there has been a move toward a far more acceptable method of waste disposal, the sanitary landfill. Landfills take advantage of the tremendous capacity of many soils to absorb and neutralize pollutants. Organic wastes can be broken down biologically into compounds that re-enter the natural cycle of plant and animal life, and soil can act as a filter for many inorganic chemicals.

In this form of disposal, each day's refuse is placed in a trench or depression, spread, compacted, and covered with up to a foot of dirt at the end of each day – or more often if necessary.

There is much to be said for a sanitary landfill. Sealing with dirt prevents open fires, vermin, and odors, and keeps litter from blowing away from the site. When properly located, designed, and managed, a landfill can be clean and attractive and transformed at some future date into parks, playgrounds, golf courses, and even airports and housing areas – while showing no trace of the refuse they contain underground.

Or, instead of stuffing a hole, household refuse can be used to sculpt a hill – such as one of the several "Mt. Trashmore's" springing up across the country. For example, after five years of stacking 400,000 tons of refuse at the same site, Virginia Beach, Va., has created one of the largest and best known of the "Mt. Trashmore's." Eventually, this site will be used for a 10,000-seat amphitheater and provide for a picnic area and a coasting ramp for soap box derbies.

However, landfill also has limitations. Suitable land is often expensive and hard to find near most cities; transportation costs tend to be prohibitive as more distant landfill sites are found. Another landfilling disadvantage, as in the case of the open dump, is that it buries valuable resources.

Incinerators, like sanitary landfills, will gain in popularity as the practice of open dumping declines. Because over half of municipal waste is organic (such as paper, wood, or textiles), incinerators are able to reduce the volume of burnable refuse to a fraction of the original – by as much as 85% in volume and 60% in weight.

As a disposal method, incineration has other advantages.

Newer-design facilities can be virtually pollution-free and can serve as a power source. Also, large incinerators do not require much space and can be centrally located in the city.

But the primary advantage of this disposal method is its ability to reduce the bulk of raw solid waste on the spot, which means reducing the amount of refuse that must be hauled longer distances to a final disposal point. With less incineration "residue" to accept at a landfill, the life of that landfill is greatly expanded.

Good as incineration is as a means of volume reduction, city facilities today handle less than 10% of all municipal refuse, and many of these older units simply shift the pollution from water to air. According to a recent study by the EPA, at least 75% of the nation's large city incinerators are substandard and fail to keep the air clean, often releasing unburned particles (mainly char, soot, and aerosol) and poisonous gases into the atmosphere. Like the open dump, outmoded incinerators waste valuable natural resources.

Even so, there are existing and emerging systems and equipment to improve the efficiency of incinerators and to make them environmentally acceptable. Collecting devices in the stacks trap both particulate and gaseous matter.

In some of the newer incineration processes, for example, electrostatic precipitators (electrically charged plates or pipes) collect or separate dust particles that would otherwise pollute the air. In the same manner, several very successful incinerators contain wet scrubbers (special gas traps) to catch this "fly ash" and many gaseous chemicals by spraying the air stream with a liquid – usually water – or forcing the air through a series of baths.

Both types of devices are less expensive and more efficient when built into the systems, as is now being done, than when attached to existing incinerators. But because building totally new incinerators is the most expensive proposition of all (often carrying an initial outlay of several million dollars), neither upgraded nor modern facilities have yet been widely used.

To achieve more than just getting rid of waste, the disposal systems of the future must be built with an eye toward more productive potential, offering more than just the negative advantages of not polluting and not creating public health problems. What they must also do is become better at reclaiming much of our urban refuse and reusing it, instead of locking up or destroying valuable resources – perhaps the greatest long-run danger.

Now, with diminishing land to bury refuse, with the need to conserve resources, and with concern about pollution, there are efforts to find values in our garbage heaps. The answer may rest in the developing technologies of resource recovery, which are creating new ways of transforming our squandered waste into wealth by exploiting our refuse as an unburned fuel or an unmined resource.

The future in this area is promising. The Congress recognized this and in 1970 passed the Resource Recovery Act. This law, instead of emphasizing solid waste disposal, focuses on closing the loop – closing the cycle – to bring those resources in our solid waste back into use, over and over again. Shortly after this landmark legislation was enacted, a dozen industries that make basic materials, packaging products, and consumer products joined together with American labor to form a unique, non-profit research organization, the National Center for Solid Waste Disposal in Washington, D.C.

In 1971, the Center changed its name to the National Center For Resource Recovery, recognizing that our principal goal is to maximize the recovery of valuable resources from mixed municipal waste.

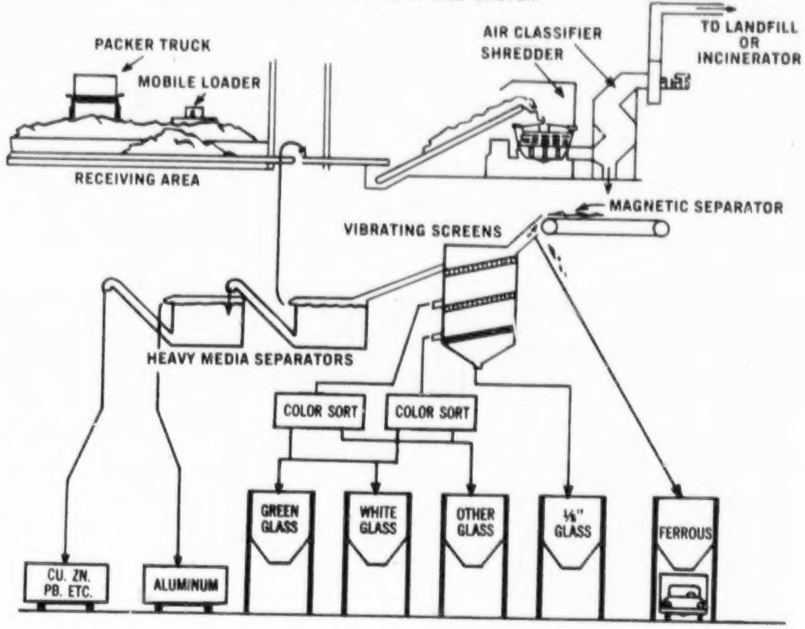
The National Center has developed four programs. The first program focuses on research into new, promising systems, with emphasis on the economics of the system under study. The second concentrates on analysis of existing and emerging technologies. The third program concerns itself with demonstrations of total resource revovery systems, and the fourth program aims to enhance public awareness of National Center programs and to keep people abreast of current practice in the field of solid waste management.

Through these programs, the National Center for Resource Recovery serves as the catalyst to pull together all the forces of American industry and labor to meet the challenge of solid waste.

The NCRR has developed a prototype system which will be tested soon in several cities, starting with New Orleans.

First the whole process of recovering and recycling municipal solid waste might be broken into two main operations: The ''Front End'' system and the ''Back End'' system. The first is the process of receiving the mixed waste (such as might be delivered to a city reclamation plant by a compactor truck) and then, through a series of mechanical steps, the start of the sorting operation.

TYPICAL FRONT END SYSTEM


PACKER TRUCK
MOBILE LOADER
RECEIVING AREA
AIR CLASSIFIER
SHREDDER
TO LANDFILL OR INCINERATOR
MAGNETIC SEPARATOR
VIBRATING SCREENS
HEAVY MEDIA SEPARATORS
COLOR SORT
COLOR SORT
CU. ZN. PB. ETC.
ALUMINUM
GREEN GLASS
WHITE GLASS
OTHER GLASS
¼" GLASS
FERROUS

In this plant, a city's mixed refuse is carried by conveyor to a shredding machine, a large device which grinds the material – somewhat like a giant kitchen blender – into uniformly-sized pieces. Light and heavy bits and pieces then enter an air classifier (or blower) in which the heavy fraction – metals and glass – drops to the bottom. Lighter (organic) particles – food waste, paper, plastics, and wood – are blown out an upward chute for disposal or some other useful application. (This shredded garbage changes its characteristics – there's no ''garbage'' odor, rats and flies aren't attracted to it, and there is no need to cover it with layers of dirt.)

With technologies already at hand, the remaining heavy materials would then pass through a magnetic separator which pulls out iron and steel for sale and recycling. Nonmagnetic materials – aluminum and glass, in particular – would then be further separated.

In the next step, vibrating screens can sort refuse particles by size, such as crushed glass, before optical scanners begin to automatically sort the glass according to color. This process employs electric eyes to distinguish color differences in a stream of clear and colored cullet and activates air jets that blow them into separate bins. At the same time, media (or liquid flotation) tanks might segregate non-ferrous metals — primarily aluminum — by variations in their specific gravity.

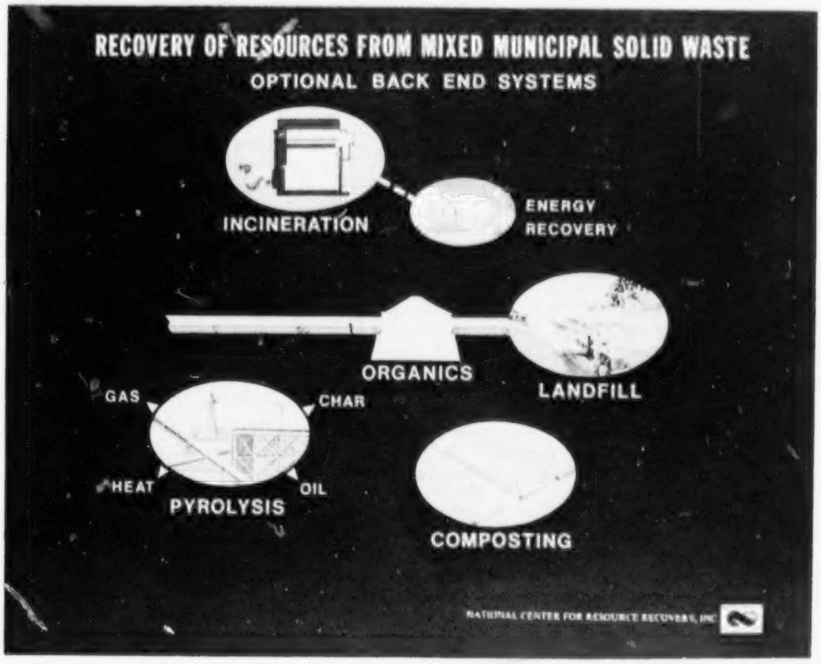
"Back End" systems, such as a number now in development, make maximum use of the lighter organic fraction not extracted at the front end. Yesterday's city dump may become tomorrow's "power company works" as scientists explore methods for converting organic refuse into new energy-yielding resources. In a total waste recovery operation, everything that would go in could come out as fuel, fertilizer, steam or electricity, and salable products.

Both here and abroad, several pollution-controlled incinerators are burning garbage and trash to produce steam. (As a fuel, mixed municipal refuse has approximately one-half of the heating value of a high grade of coal). The steam is then used to provide central building heat directly, or to drive gas turbines to generate electricity.

In Paris, for example, a substantial portion of the city's steam heat in winter is derived from the city's own refuse. In our own country, the Norfolk Naval Station in Virginia has been using garbage to generate steam since 1967, and Chicago's new Northwest incinerator, designed as a European-type model to produce salable heat as a by-product, will also salvage metal cans from the refuse it receives.

Another advanced approach is the Combustion Power Company's research program in Menlo Park, Calif. aimed at using daily solid waste from our cities as a fuel to produce electricity. Called the CPU-400, this pilot system extracts metals and glass, while the organic refuse — combusted under high pressure in a fluidized bed incinerator — produces electric power, recovering waste in the forms of both materials and energy. In the city of St. Louis, city authorities, the U.S. Environmental Protection Agency, and the Union Electric Company have a combined project to burn about 300 tons of city refuse each day as a supplementary fuel in one of the power company's coal burning boilers, constituting about 15% of the metropolitan fuel requirement.

And that's not the whole story in rapidly advancing "back end" technology. Burning refuse for power saves fossil and nuclear fuels, but we can also convert garbage and trash into "storable" fuels.



RECOVERY OF RESOURCES FROM MIXED MUNICIPAL SOLID WASTE

OPTIONAL BACK END SYSTEMS

NATIONAL CENTER FOR RESOURCE RECOVERY, INC

Although still on the horizon, the pyrolysis form of incineration may bring us even closer to what might be called a state of "zero waste growth." Similar to the industry's method of producing oil and coke from coal, this method decomposes organic materials to acids, alcohols, and condensable gases. Instead of being burned, wastes are baked at high temperatures without oxygen, which reduces the volume by about 90%, producing such useful materials as charcoal and industrial fuels, as well as steam and electricity.

With demand for electric power doubling each decade and fuel bills mounting furiously, recovery of the heat values of organic refuse can make a significant contribution to our energy pool. Garbage may well have the potential to "give back" to the environment almost all of the energy that it took away in the first place. This is resource recovery in its truest sense.

One ton of pyrolized solid waste (at 1600°F) yields the following:

18,000 cubic feet of gas, a mixture of hydrogen, methane, ethylene, and carbon monoxide. This mix is a low-sulfur fuel with 5 to 8 million BTU's of available energy.

114 gallons of liquid, about 90% water.

25 pounds of ammonium sulfate. This can be used as fertilizer and in water purification.

0.5 gallons of tar.

154 pounds of solid residue. This contains a mix of metals and glass which could be recovered and sold.

A large hospital in Concord, N.C., the Cabarrus, is presently installing one of these pyrolysis plants to solve the problems generated by 8 tons of mess a day, 3,000 tons a year. It has been very expensive to collect, transport and dispose of this waste. It is anticipated that within 5 to 8 years the plant will have paid for itself through savings. Furthermore, the gas recovered will heat all the buildings and supply energy to provide for all of its electrical needs.

Still another waste disposal method — composting — is well known to home gardeners. Municipal composting is most common in Europe, where few land sites remain. It is also one of the oldest and most familiar forms of resource recovery, using bacterial and chemical processes to convert organic wastes into soil conditioner — capable of enriching gardens and farm lands.

It was originally hoped that a profitable business could be made in the production of compost, but that business was never well established in the U.S. because there are so many other sources of less expensive chemical fertilizers. In this country, the cost is high for separating the organic compounds from the waste stream and for transporting the compost to the point of use.

But again, as with other methods of resource recovery, the social benefits — in health, cleanliness, and resource conservation — as well as the costs of other methods of disposal, must be added in before we dismiss a process as "uneconomical."

To repeat, resource recovery is a broad term, and our daily garbage and trash can be put to work for us in many ways. Valuable resources — otherwise destined for disposal — can be mechanically extracted from mixed municipal refuse for recycling and reuse. What's left after this separation can — through careful planning and application of technology — also prove to be a valuable resource, even during the disposal process. Land recovery is one example, energy conversion is another one.

Thus the problem is not to invent the ways but to make the best use of those already at hand — in both the "front" and "back" ends of a total resource recovery system.

The challenge before us all seems clear. We must take immediate advantage of the technology developed to recover the diminishing resources, to convert the light fraction into valuable and much needed fuel, and to solve the burgeoning municipal solid waste disposal problem. We must provide funds for promising solid waste demonstration projects. We must develop a new national policy for our primary and secondary (recovered) resources. If we can overcome the usual obstacles, economically and politically, these things can be, and must be done, for a better tomorrow.

Mr. Bernardo is the Director of Educational Programs, National Center for Resource Recovery.

Demands and Desires of Students in the Urban Society

Kevin W. Kist

What are the major problems confronting the public schools? How relevant are these to the demands and desires of students in the urban society, and how are their needs reflected in those of their teachers and parents? The answers to these and other such probing questions will act as a catalyst to bring the problems of urban education into clearer focus. This focus can be sharpened by realizing that the individual student's background is one of the main factors shaping his attitude and response to education, even though his basic needs will be similar to that of all students – confidence in his own ability and recognition of his individual worth.

According to the Fourth Annual Gallup Poll of Public Attitudes toward Education,[1] "Discipline again ranks as the number one problem of the public school in the citizens of the nation." For one brief year, 1971, it dropped to third place in the list. Last year discipline was restored to the top position held in earlier years. Based upon the number of mentions to the open question, "What do you think are the biggest problems with which the public schools in this community must deal?", the top problems are as follows:

1. Lack of discipline
2. Lack of proper financial support
3. Integration-segregation problems
4. Difficulty of getting "good" teachers
5. Large school, too large classes
6. Parents' lack of interest
7. Lack of proper facilities
8. Poor curriculum
9. Use of dope, drugs

Since two years ago, the number of times the use of dope and drugs was mentioned as a serious problem of the schools has dropped significantly – from fifth place in 1971 to ninth place in 1972.

As part of this particular inquiry on the "biggest problems," the question of "student rights" was posed with the following queries. Generally speaking, do the local public school students in this community have too many rights and privileges, or not enough? The general public replied:

Too many	41%
Not enough	11%
Just right	33%
No opinion	15%

Since 18-year-olds now have the right to vote, the question has arisen as to whether, as full-fledged citizens, they should not have more rights than other students. The public says "no" in resounding fashion. The question: Should students who are 18 years of age, and now have the right to vote, have more rights and privileges than other students?

Yes	21%
No	73%
No opinion	6%

It is worth noting again that in the 1971 survey the public agreed, by a substantial majority, that while discipline was a major concern, "If the schools and teachers interest the children in learning, most disciplinary problems disappear."

Another way of stating this sensitivity to both physical and educational growth in a child is to reiterate that the student wants someone, somewhere, to "Give a Damn," especially in this dehumanizing urban society in which he lives and is educated. The students demand an education; but unfortunately, they do not really know how to acquire it. Why? Because they fail to perceive the large picture but are instead caught up in shortsighted approaches and solutions to their immediate problems. For a moment, let us take a look at some of these complaints as expressed recently at one of the local high schools in New York City.

February 20, 1973 — SOME STUDENT COMPLAINTS

1. No seats to sit outside by lunchroom.
2. Not allowed to go to the lavatory during homeroom.
3. No food available in lunchroom after the 6th period.
4. Not allowed to go out for lunch.
5. Objections to assigned seats in lunchroom.
6. No place to smoke besides behind cafeteria.
7. The Student Organization does nothing for us.
8. No funds for special classes.
9. No grants to go on class trips.
10. Unlock doors!
11. It takes too long to get anything out of your locker, then you get in trouble for being late.
12. We are not excused for being late. (Even when buses fail us)
13. Not enough time for getting to classes (from A to D wing or 1st floor or basement to 3rd floor).
14. We get in trouble for having coats before homeroom.
15. Change of lunchroom procedure!
16. Lunchroom food isn't good.
17. No buses after 6th period.
18. Four cuts per marking period for each class.
19. A smoking lounge for everyone.
20. The attendance rules 'stink.'
21. Two latenesses equal 1/2 cut.
22. Robbery of clothing, etc., from lockers (especially in gym).
23. We want class representatives for each class.
24. Sub-Teachers — Something left to be desired.

One unfortunate observation is that most of these complaints are legitimate and could probably have been resolved by immediate attention to small administrative details. If, as an example, the student organization (No. 7 and 23) was a viable one in which the students had confidence, they could have begun to work toward solving these problems one at a time as they occurred before it blossomed into a confrontation. Number 12 has been resolved, but only after this list of complaints was submitted as an ultimatum. Should good educational administration be crisis-oriented?

The student is an individual and wishes to be treated as one. He wants his own needs and desires (which become demands in later grades) to be considered by someone who cares about him as a person — for himself. He does not wish to be part of a problem, a solution, or a program, but he will if it assures him of recognition. The overpowering drive which I have observed in students from elementary school through college is that each student wants to "be somebody."

Let us now address ourselves to the softer approach, or the desires of the students, their parents, and their teachers. Some of the desires that should be expressed by the educators are those highlighted by Lewis F. Powell, Jr., Associate Justice of the U.S. Supreme Court,[2] in his address to members of the American Bar Association when he expressed the idea that a sense of honor is necessary to personal self-respect; that duty, recognizing an individual subordination to community welfare, is as important as rights; that loyalty, which is based on trustworthiness of honorable men, is still a virtue; and that work and self-discipline are as essential to individual happiness as they are to a viable society.

Today the overriding concern often seems to be a highly individualized self-interest. In the familiar phrase, everyone wants to do "his own thing." Self-assertion seems to be the modern aspiration — to be independent of the familiar disciplines and values of home, school, church, and community, which once gave direction to young lives. These were our reference points, the institutions which molded our characters, and from which we gained an inner strength, a sense of belonging, as well as a sense of responsibility to others. Unfortunately, these are the very influences that are being ignored by the urban student today because of the manner in which they interpret their needs, desires, and their demand to do "their own thing." The educators' role should be to help them through their relevant and enthusiastic guidance to find their own thing, their own talents, their own vocation, and through these, their own identity which they strive for so desperately in a sea of rhetoric and platitudes.

The parents' desires for their youngsters' education are not divorced from the concerns of the educator, but they are couched in different terms. The following are a few verbatim comments and suggestions that were gathered by the Gallup Survey:

> "Teachers could try much harder to interest students in the subjects they teach. Children can't judge how important something is. They must be told—and sold."
>
> "I have found that if a teacher is enthusiastic about his subject, the students will also be enthusiastic. And you can be sure if he isn't, the students will be bored."
>
> "More field trips, extra work, doing things they enjoy doing. You learn by doing"
>
> "More discipline is needed to control the hoodlum element. Students can't be expected to learn when the school is in a state of chaos."
>
> "There should be better communication between the teacher and the parent in order to make the parent more effective. The parent could then show more interest in the work the child is doing; and the child, as a result, would take more interest in school."
>
> "My recipe would be to give more responsibility to the student and to select livelier teachers."
>
> "Give the students more study freedom, better access to books. Let students decide what their interests are and then encourage them to follow up these interests."
>
> "Some teachers are just plain boring. There should be some way to reward, with higher salaries, those who are able to interest students."
>
> "Since sports have been cut out of our schools to save money, my son has lost interest in the school and in his work."
>
> "Keep up the creative challenge all the time. School should expect more of every student—the poor as well as the good."
>
> "In this community, the kids are afraid to go to school. The bullies and problem makers should be put together and not allowed to bother other students."
>
> "Schools should plan a whole series of special talks to get students to understand and appreciate the importance of what the school is trying to teach them."

Students have a very real and necessary responsibility, and that is the understanding of their accountability for their own actions. How foolish it is to spend a half million dollars on a federally funded study, such as one in which I am now involved in New York City, when the youngsters have no understanding of this responsibility, and there is no money available even for the meagerest of supplies to keep the children interested and motivated; when the majority of the teachers, 50%-75% of whom have less than two years teaching experience, refuse to communicate with the administration because of distrust. What type of direction is education offering to these students caught up in such a chaotic and frustrating situation? How can you introduce career education, competency-based education, modular instruction, or any of the other innovative approaches in a situation such as this? It may be a cliche, but you cannot build without a strong foundation — we must return to the basics. The student desires, whether or not they can be overtly stated by them, lack in most cases the depth and perception needed to clearly and definitively deal with the problem. A sampling of the answers to the question, "Why are you going to school?" gathered by some of my students currently licensed to teach in New York City include:

> "To learn and get my education so that I can go to Grambling and play pro football or be a dental technician."
>
> "So I can learn to read, write, and have a better job."
>
> "Because I have to learn to be educated."
>
> "I am trying to be somebody and learn how to find a job."

"Because I have a goal. My goal is to be a detective artist."

"To talk to the girls."

"To learn to become somebody in life or to have a good life."

"Because I want to have a good education and learn how to do things and speak different languages."

Some students stated they wanted more voice in the selection of their courses, freedom of dress style, discipline and fairness, less restriction in the classroom; and many said they wanted "out" of forced school attendance.

Now we come to perhaps the most difficult part of this topic — the needs of the parents, the teachers, and the students themselves. The parents, like parents of children anywhere, hope to give their children more than they had — more specifically, give them a better education and have this education provide them with the means to get better jobs and to get along better with people at all levels of society. A secondary goal that the parents envision for their children is to make money and achieve financial success and stability. Also important to the parents is to have the youngsters be happy in their chosen vocation and to have the educational world stimulate their children's minds. These concerns, obviously, indicate that the public regards education largely in a pragmatic way. The strong emphasis on material goals at the expense of the aesthetics and purely intellectual development should not come as any real surprise. Since such importance in our society is placed on material wealth, the road to success in life is through education. It will be through education that all of the aforementioned benefits can be derived. If the urban student can substantially change his earning potential and his employment prospects, then perhaps he will be able to raise himself from his stifling, frustrating, and ambition-deadening ghetto existence.

Parental concerns for children in the secondary schools naturally would be quite different from concerns for their children in elementary school. The Gallup Poll reported that the primary concerns for junior and senior high school students are: respect for law and authority; solve problems and think for themselves; vocational skills; getting along with others; learning the skills of speaking and listening; learning about the world of today and yesterday; skills of reading, writing, and mathematics; health and physical education; and finally, the last concern is learning how to compete with others.

It is not enough merely to give the student information in our classes through a lively and enthusiastic presentation; he must be treated as an individual — with all that that statement implies. The teacher needs to have realistic standards and be sincerely interested in the student's development, for the student craves approval and recognition from someone other than his parents, if indeed there are parents in the home. The teacher should be available to the student and have him feel free to share a confidence or be able to seek more sound advice and guidance. Guidance counselors cannot give this kind of time and attention to each student. Therefore, every teacher must reach out and try to assist as many students as possible. This guidance and concern for the student is as critical as the curriculum in any subject area. This in no way means that we are to submit to their 'demands' nor be their 'buddy,' but it does place the burden on us to help them define their desires and reach their goals. The respect a student has for his teacher is directly proportional to the ability the instructor has to relate to the youngsters and to give relevancy to the information disseminated to the students. The teacher's need is the opportunity to teach in an undisturbed atmosphere conducive to learning. This atmosphere will prevail when, and only when, the parents and children can comprehend the relevancy, the logic, the direction of their educational program. It is up to us, the educators, to be certain that this clear picture of purpose emerges so forcefully that all involved can make no mistake of the intent or seriousness of purpose.

Interestingly enough, however, when a child does poorly in school, the consensus of opinion is that the child's home life and the children themselves are to blame. It is rather amazing to see that with such agreement that the home influences the chances of educational success, there is so little attention being given to the solution of this problem. If a child's chance of success is largely dependent on his home life and the type of reinforcement and support the school receives, then some priorities need to be reordered so that more time and effort can be devoted to discovering ways to deal with this home influence. Although many schools are making an effort to bridge the gap between home and school through the P.T.A., all too often their efforts are either casual, slightly misdirected, or unsupported. There must be a return to basic, realistic standards and a sincere commitment to involve the parents and teachers in building support for an effective educational program. Once the proper atmosphere of discipline, organization, and commitment has been established, we can then proceed with introducing new programs and improving the over-all educational picture.

My message, therefore, is basically a very simple one, and one of which most of us are already aware. For this reason, I feel like the minister who is complaining to those gathered in church about the poor attendance at the service. For you, by your participation in this convention, are demonstrating that you indeed are the interested teachers, chairmen, supervisors, administrators, and teacher educators. However, to use the example of the minister again, we are not here to comfort the afflicted, but rather to afflict those who are comfortable, to stir the complacent ones, to challenge the laminated security of those who are insensitive to basic educational problems, to open our ears, and to employ our pedagogical wizardry so that the student in the urban society knows that someone, somewhere, somehow, "Gives a Damn."

FOOTNOTES

(1) Fourth Annual Gallup Poll of Public Attitudes Toward Education by George H. Gallup, 1972, as reprinted in Phi Delta Kappan, September 1972. pp. 33-44.

(2) What Has Happened to the Old American Values? Condensed from an address to members of the American Bar Association by Lewis F. Powell, Jr., Associate Justice of the U.S. Supreme Court. Reader's Digest, November 1972. pp. 170-172.

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Student Choice in an Urban Society

Larry Heath

You cannot pick up a newspaper today without reading about another urban crisis. The urban areas are spreading and the tax base, government services, transportation, and all other services are not keeping pace. Education is one of the major areas that is in trouble. As education becomes bogged down, its effectiveness with students decreases. I hope to show, in this presentation, some work that has been done, that can help education be more effective.

URBAN SCHOOLS AND SOCIETY

The first, and perhaps most difficult task when discussing urban problems, is to define what you mean by urban. For my purposes, I have chosen to discuss urban as any city of 50,000 population and larger. Once you reach cities of this size, you will have school systems that have a great deal in common. There will be large high schools, several junior high schools or middle schools, and you will have the problems of racial mixing. These factors will vary in degree, obviously, as you get into cities of one million and larger. Inner-city will be used to refer to the downtown areas of large cities.

It doesn't take much reading to realize that urban schools have a great number of problems. A simple listing of these will strike up enough trouble in your mind to make my point. The most obvious problems include: extreme financial crisis, superintendents quitting and being fired, bussing, overcrowding of old schools, teacher strikes, questions about the value of education, and accountability. All of these problems are unresolved. They give the schools an air of frustration and anxiety.

The urban family is in almost as much trouble as the schools. A recent television special painted a rather grim picture. These problems are perhaps exaggerated, but they are present and again lead to a feeling of frustration. Some of the problems that are perhaps the worst in the inner-city areas include: fatherless homes, welfare problems and scandals, high unemployment for youth, drugs, and crime.

The racial problems in America have not been solved. Talk to a minority member, and you will be aware of the anxiety, frustration, and perplexity. All of this is not bad; the problems are not all negative. But problems do exist that are difficult to solve. In summary, these include: identity problems, no direct paths to success, poor family attitudes, reverse discrimination, extra privileges, "hands off" attitude of whites, and continued bigotry. As a result of this mix of problems, many minority students give up. In addition to the students' giving up, schools and public agencies have given up, also.

In this milieu, students face choices, just as you and I did in perhaps simpler times. These choices include: stay in school and, when finished, try to get a job, go in the service or go to college; quit school and try to find work; quit school and do nothing; get involved in drugs, and possibly crime; or be *in and out*, of school, a job, jail. These choices are being faced by urban students every day, and they are making their choices, often to everyone's consternation.

This has been a rather quick attempt to sketch some of the realities of urban America. It is, of course, not all bad. The schools are very successful with some youngsters. A very high percentage of students study hard; they take that first choice. We need to be very thankful for those people. The question becomes how we can help more students to become successful in the face of the complex urban world we live in. And one thing is for sure, more and more of us will live in urban America.

DEVELOPMENTS IN PSYCHOLOGY

Any change in education should be carefully analyzed in light of our present knowledge of psychology before it is seriously advocated. I'm afraid this is not always done. Perhaps this is so because some people question the works and wisdom of our psychologists. Regardless of this, the question remains, are the activities of the teachers in dealing with students based on a sound knowledge of human development?

The works of Berne, Coombs, Glasser, and Harris have come to my attention recently, and they seem to be describing consistent theories and plans of action. These psychologists recommend that we help students: face reality, know who they are, know where they are, and make logical decisions. In *I'm OK, You're OK*, Harris describes the cause for, and a way of dealing with the problems that students have in dealing with reality. It is possible to infer possible consistent behavior on the part of the teachers. This description pictures each person as being made up of basically three major influences. These are the early programming of the child in his natural curiosity. This part of the person is referred to as the Child. In addition to a Child, we each seem to also carry around with us recordings of the rules and regulations that we read from our parents. These recordings are called the Parent. The last to develop is the Adult. This is the logical decision-making ability of the individual. None of these recordings are bad or good, they simply exist in each of us. The task of the parent and teacher is to help the developing child learn to control the Parent and Child with the guidance of the Adult. We can only help others in those things that we can do ourselves. The teacher, if he wants to help students learn to be responsible adults, must act as an adult himself. In the urban situation, this may call for an individual to overcome a great deal of racial prejudice and insensitivity.

Recent research has pointed to what we have all known for a long time. The home and family environment probably has a lot more to do with a person's eventual success or failure than the efforts of the schools. A great deal of evidence indicates that the person's major personality is structured by the time he is two or three years old. The fact remains, however, that each person who interacts with the child has some influence. If the teacher wants that influence to be positive, he must seek out ways to help the child be successful. Berne calls people frogs and princes. It is very difficult for a frog to become a prince. Everyone that knows the frog can help a little. The feedback that the person gets from those he interacts with shapes his view of the world. This is a very personal feedback that is completely individualized.

Coombs indicates that the teacher's attitude and philosophy are the primary indicators of his potential success as a helper. This statement emphasizes that to help students develop positive self-concepts, the teacher must have a positive attitude toward his work, the purpose of the school, and the importance of each individual student.

Students seem to learn primarily by imitation. If they have interested, excited teachers who believe the students can, the students will be interested and able. Motivation, the key to a successful program in most people's mind, is achieved through example, not by preaching or injection.

You probably do not think these statements about psychology say anything new. Perhaps they don't. My point is that they are being used to help large numbers of the adult and student world to be able to deal with their worlds. We, as teachers, need to practice these concepts if we are aware of them. Any close look at traditional teaching paints a very black picture on most of the points I have mentioned.

GROWTH OF INDIVIDUALIZED INSTRUCTION

Individualized instruction is being used from the pre-school nursery to the graduate classes. American education seems to have decided that if men can go to the moon, the age-old dream of helping each individual child reach his maximum potential can be reached. While many schools are not trying in any significant way to change from the traditional structured classroom, enough schools are involved to indicate that this is a major effort on the part of the total educational system. It is possible, in most parts of the country, to drive easily to a school that is seriously attempting to individualize their total program.

The major characteristics of a school program that is individualized usually include most of the following:

1. Content defined in behavioral terms
2. Student-centered (one or more of the following)
    a. Teacher controls direction and method, student can progress at his own pace
    b. Teacher and student work together to decide what and how the student will learn
    c. The student directs his own learning and reports progress to the teacher
3. Flexible time schedules
4. Performance-based reporting systems

Once a school has individualized its program, students seem to be able to adapt and to make rapid progress. Side benefits of the individualization process include: accountability for content learned; open entry, open exit, without major problems; and students gain experience in directing their own learning.

Individualized instruction works. The question now is how to implement its advantages effectively for each subject area.

INDUSTRIAL ARTS ACTION

I have tried to sketch three topics that to me are separate but very important for the industrial arts teacher if he wants to help youngsters.

My experience indicates that it is possible for industrial arts teachers to present programs that are exciting for kids, relate to the real world, and help the student continue to make the first choice to be a success, a prince instead of a frog.

Many teachers have been successful without the materials and strategies that I am about to describe. Personally, I feel that I have had a great deal more success with these newer methods than I did previously. As I take on responsibilities for new courses, I am developing materials and methods as fast as I can to implement the ideas I am professing to you.

It is my belief that by preparing materials and strategies to offer his students an individualized program, the industrial arts teacher will greatly improve his chances of helping all the kids that come to his classes.

How does he do it? First of all, by deciding he wants to. That may sound trite or silly to you, but where there is a will, there is a way.

My involvement with individualized instruction started when I came to the conclusion that I was losing many of my best students, those with previous technical knowledge, in my traditionally-structured classes. I was able to secure some funds, along with eight other colleges in Oregon, to develop some instructional materials for electronics. This project later became known as the ICE project (Individualized Curriculum for Electronics).

By working together, the instructors in the ICE project were able to identify the content they were concerned with, prepare instructional materials, and successfully use the program. Without close teamwork and cooperation, none of the participants would have been able to try individualized instruction.

The essential elements of the ICE program include the following:

1. Defined content. The content was carefully defined by using a task analysis and a survey of the appropriate theory.

2. Behavioral objectives. All of the content was stated in behavioral terms so it could be measured.

3. Master Package List. The contents of the total program were summarized in a master list for easy reference. Prescription sheets were used to assign units.

4. Learning Packages. You do not have to have learning packages to individualize your instruction. The ICE project did use them as the primary organizing element, and in some ways, this caused problems later.

5. Tests. Each of the learning packages had three tests. These included a pre-test, a post-test, and a self-test. This was one of the most difficult parts to write.

The ICE system was revised three times and now covers the content for electronics from the eleventh grade through a two-year technical education program. It is being used all across the United States.

Materials similar to the ICE program have been developed in Oregon in the following areas: construction, drafting, machine tools, metals, industrial mechanics, automotive, food service, bookkeeping, and accounting. These materials can be used at both the high school level and the community or junior college level. To get the details on ordering these, write to: Mr. Roland Smith, 100 Waldo Hall, Division of Continuing Education Publications, Oregon State University, Corvallis, Oregon 97331. The price of these materials averages about $0.25 per package. They are available in classroom sets and in quantities for specific titles.

TEACHING WITH INDIVIDUALIZED INSTRUCTION

The goal of individualized instruction is to help each student find his best learning style. This means that some students will need structure and a great deal of direction. Other students will quickly be able to work on their own. Individualized instruction does not mean that you have to use learning packages at all. Many people have developed exciting programs by using other types of materials.

Learning packages can be very helpful if you have them. The basic requirement, as I said earlier, is your desire to help each student. The second thing you must do is decide what you really want the student to learn. Is it more important for your students to learn to operate a skill saw or to learn to describe how lumber is processed? You must decide what you want them to learn and then design some strategies for helping the students learn.

Some people react to this statement of prior definition in horror. They feel that by defining ahead of time what you want the student to learn, you have limited him. Nothing could be further from the truth. You may decide that you want the student to learn a set of basics, under your guidance, then you want him to branch out on his own. By defining the content ahead of time, and by thinking about the importance of the content, you are also much freer to encourage students that already have that content, or don't think it is important, to skip the work. By defining what you are doing, you can be flexible. If you are deciding day-by-day what will happen next, you and the student are locked in. You can't tell him to do something else that seems more important because you don't know for sure how important what you are doing is.

The third, and perhaps most important step, is to select and define a variety of ways that the students can use to achieve your objectives. Try to find at least three different ways a student can use to learn each specific objective. This is tough. It is also the heart of good teaching, in any setting.

Once you have your objectives and methods worked out, write down exactly what you will accept, as a minimum, for successful completion of each objective. This completes the essential parts of your learning system.

The next and last part of the system is for you, the teacher. How are you going to manage the learning system? You need to give this considerable thought and then work out a plan, in detail. This plan should include:

1. How you will get the students started.
2. How you will keep track of where the students are.
3. The grading system (performance-based, if possible).
4. How students will select their own objectives.
5. Evaluation measures you will use. Is the system working, or does everyone hate it?
6. Ways of changing the system, and when you will try them.

These are just some of the more obvious questions and preparations you must work out. Sound like a lot of work? Well, it is. This is why I think teachers should work together to prepare materials and strategies. If you are in a large urban district, you are seldom the only teacher teaching a specific subject. Get together with the other people, divide up the work, and agree to work as a team rather than as separate little kings.

If you try individualized instruction, it will only work if you want it to. You will have to work hard to help each student. Challenging 150 kids a day is hard work.

SUMMARY

Urban problems are difficult to define and more difficult to try to find reasonable answers to. All students need, but urban kids are desperate for, interested adults that will be sensitive to their needs and try to help in a humane way. Our modern world is difficult for even the most capable adult. It can be a nightmare for a lost soul. Kids need people that care. As a teacher, you can care by organizing your teaching to give each student every possible opportunity for success. If you can find a way to touch each child with a little success, you will be a great success. Learning packages and the basic concepts of individualized instruction seem to be more effective in helping students than the traditional structured classroom. But they are a lot of work. The teacher must want to reach each student. If he does, he will find a way. To help urban kids face the difficult decisions they must make every day, they need your help in making decisions in school. When they make a wrong decision in school, there is a concerned adult, you, there to pick them up. When they make a wrong decision in the modern urban world, they may not have a chance to make any more decisions.

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Disadvantaged and Handicapped Youth in an Urban Society

Chester R. Anderson

To be able to understand and work with urban youth, we cannot make the errors that have been made in this title. How can one develop rapport with the central city youth by referring to them as disadvantaged, hardcore, poor, culturally deprived, underachievers, and below average compared to other ethnic groups?

The identifications must go! Society is crushing these youth, and I believe that this is what our society intended by using these terms. Our society is cruel, the man with two faces. How would you feel if someone called you these unmotivating names from the time you were just learning to talk and walk until you were in high school?

Let us examine urban youth further and see if we, all of us, could have the same identifications. I was speaking at a breakfast with some big business men in Kansas City, Missouri. After our discussions, one of the bankers said, "Andy, what about those disadvantaged urban city youth. . . ." I said, "Are you disadvantaged?" He immediately answered, "No!" I asked him why he couldn't fly a jet? He answered, 'Because I have not been taught." This was the answer I wanted. Then, I said, "These young people are in the same learning pattern. They just have not been taught. These young people need to be taught by understanding teachers who care."

Another of education's familiar phrases is "culturally deprived," which simply means that city youth have not been attuned to American culture or the white man's established culture. May I remind you of the meaning of cultural; it is the sum total of the attainment of activities of any period, race, or people, including their implements, handicrafts, agriculture, economics, music, art, religion, beliefs, traditions, language, and story telling.

Now why was it necessary for me to discuss what I just said? If these urban youth are disadvantaged and culturally deprived, then I must remind you that you, as teachers, are disadvantaged and culturally deprived if you don't know anything about their culture, because all people have some form of culture. This being the case, we have many disadvantaged and culturally deprived educators, such as superintendents, assistant superintendents, directors, principals, counselors, and teachers.

City youth have a culture: language, tools, music, art, religion, and beliefs. I am speaking of the American Indians, Mexican-Americans, Blacks, Puerto Ricans, Italians, etc. We can reach these youth with greater ease if we know something of their background. They have learned to survive in a society in which you and I could not live.

Urban youth, who are called culturally deprived, have developed a kind of mental toughness and survival skill, in terms of coping with life, which makes them superior in many ways to their neighbors growing up in the material influence of suburbia. These youth know how to deal with bill collectors, building superintendents, corner grocery stores, hippies, pimps, sickness, and death. They know how to give school principals, counselors, teachers, welfare workers, juvenile authorities the ''slip,'' and by doing so display psychological cleverness and originality. They recognize very early that they exist in an environment which is sometimes complicated and hostile. They may not be able to verbalize, but they have already mastered what existential psychologists state to be the basic human condition that in life, pain and struggle are unavoidable, and that a complete sense of one's identity can only be achieved by both recognizing and directly confronting an unkind alien existence. Working with these youth, you will find that they are not dumb! It is our duty to motivate them and channel their energy in the right direction.

As an example, a young white social worker, after observing a teenage black male going about cooking, cleaning, washing, and helping his mother with the children in his family, wrote in her report that his masculine development might be harmed by such feminine activities. However, what the social worker failed to see was that this black teenager did not rigidly separate male and female roles in his mind, and more important, he was helping his mother and family. This boy also had a part-time job; was a member of the track team at the local high school; an able student; had a very healthy sex life with some of the younger women of the neighborhood; and was respected by his ''street brothers,'' a cultural gang, when it came down to his ability to throw fists when necessary.

Many of these city youths must be motivated by teachers. We are going to have to sit down with them in their surroundings and ask them why they are dropping out of school. They will tell you. You may have to dress as they do, and you should. You will need to learn to talk and understand their language, because English, to many urban youth, is a

WHY JOB ATTITUDES OF NEGROES DIFFER

When I was 15 years old, I began working as a copyboy on a newspaper, going to school days while working nights. I didn't have to; I just wanted to. But suppose that I had to—suppose further that I knew I could never rise above the copyboy level.

What incentive would I have had to work hard and well, to take an extra assignment, to study my craft diligently, to prepare myself for eventual promotion? In a dead-end job, I would soon get to have a dead-end.

I don't think enough people understand this about Negro workers—in the past, and still to a large extent today. White people tend to evaluate Negro workers by white standards and expectations, not bv the more realistic appraisal Negroes make of their own chances.

Work must have a goal beyond mere subsistence if it is to give the worker any esprit of interest in the job beyond the mere paycheck. The job must promise promotion, or must be essentially interesting or at the least pay enough so that the worker can anticipate a high standard of living, for his children, if not for himself.

Most jobs available to Negroes in this country, in the century, have been deficient in all three elements. They have been dull and meaningless labor, offering no chance for advancement, paying so little that only day-to-day satisfactions could be fulfilled. The "sense of the future," which keeps most white people going, has not operated, or only dimly, among the mass of Negro workers.

The whites' complaints about the Negroes' indolence and indifference to showing up on time (or at all) ignores the psychological gap between white and black "time sense." Whites live more for the future, because they have a future; blacks for the present, since the future looks too bleak to contemplate.

As Elliot Liebow puts it in his recent study of Negro street-corner men, "The job fails the man, and then the man fails the job." If only dull, dirty, and dead-end jobs are available to blacks, they lose whatever self-esteem they might have had, and would just as soon loaf or take relief as work, especially when most of the jobs open to them don't even allow them to support a family in a manly, self-respecting, and decent fashion.

Asking them to "shape up" is as fatuous and cruel as asking a man to do the broad jump after we have broken both his legs.

This should be a truism acknowledged by the white community—particularly in a society such as ours, where "incentive" is the key word in our scramble for material advancement. Why the Negro, being a victim rather than a beneficiary of our incentive system, is yet expected to behave the way we do, is a symptom of our own sickness more than of his.

.________________ Sydney J. Harris; Detroit Free Press; August 12, 1968.

foreign or second language. We, as educators, cannot be ''Mr. Know-it-all,'' because, first, we want answers from these youth and, secondly, educators do not know-it-all, I don't care how many degrees you may have under your name.

The most successful educational models tend to capitalize on the experiences which city youth bring to the classroom, as opposed to constantly reminding the youth of his weaknesses. Educators must have some awareness of these students' backgrounds, especially their home, family, immediate neighborhood, and agencies which directly affect their lives.

Educators fail to take into consideration these experiences when they assume that because one is Black, Mexican, Indian, or a member of any other minority group, he is impulsive, emotionally immature, and has less tolerance for stress.

Urban youth have a low self-image. They think of themselves as social outcasts and believe that society has done them wrong and a great injustice. Consequently, a good part of their behavior is exhibited with a chip on their shoulder. Individuals and groups in the urban society act in direct relation to the way they define and value themselves and their world. If persons or groups see themselves as failures and not good, then those persons or groups will act accordingly. These youth have not seen themselves on T.V. or heard voices of their own race on the radio. The negative image is there.

We must try to understand city youth. We must be able to communicate with these youth. Whether you believe it or not, our society is responsible for whatever happens in

our communities. Our society condones and perpetuates conditions of hunger, poor housing, poor education, and poverty for minorities by not really communicating with urban youth.

City parents have not been taught the skills needed in the technological society in which we live today. They have not been given a chance to train for our technological world. They have been given menial tasks, with low wages and few advancements. Therefore, city youth are products of this oppression.

How can one motivate children who come to school hungry and poorly clothed because their parents are unable to buy them food and clothing? Many of their parents have been placed in jail unable to post bail, so they spend their time in jail. All of these things have a direct effect on these youth.

These are youth whose parents pay for luxuries they would not buy if they had more self-discipline or more education. Basically, these parents buy things they cannot afford and sign contracts they shouldn't because no one has ever taken the time to teach them about relevant economics or how to manage their money.

Urban youth want a piece of the education action. The whole system blocks their efforts through examinations, testing, weeding out, I.Q. tests, and standard forms based on the environment of the middle class white, and these youths know it. How would you feel if you were given one of the "chittering" tests?

Motivated teachers will know that city youth are learners. The will to learn burns in each one of them. How and what they learn is out of their control and in the hands of educators. These educators must be held responsible for much of our city problems. Urban youth want to achieve; they want to become self-determining, self-efficient, and have self-respect.

I don't want anyone here to believe that all urban youth who need a better education are poor, hungry, dropouts, or push-outs. There is a good cross-section of youth in America.

There are city youth who have everything they want or need, who live in comfortable homes and whose parents have good jobs.

We also have those urban youth on the street corners who have been labeled lazy, will not work, dumb, and won't go to school. However, there are some city youth who are fed up with the kind of education that has no meaning. These are youth who can drop a transmission from a 1973 Pontiac in seven to eight minutes or less while you are in a place of business. They will take that same transmission and put it in a 1968 car. A group can take out the motor of your car or mine, lift it out, place it in the trunk of another car, and be on their way in a short time. How do I know this? I have good communication and rapport with these youth.

As soon as you and I, as educators, learn to channel this energy in a direction relevant to these youth, we will be in a position to help them help themselves.

If a youth likes auto mechanics and dislikes English, put him in a mechanics shop for a period of time; if he has a good teacher, this can do a great deal for him. The mechanics teacher could have him write a theme on the four barrel carburetor and work with his English teacher for structure, grammar, etc. The mechanics teacher will correct the theme for information. Through this means, the English teacher will be learning, and the youth will see the need for both English and mechanics. This can be accomplished with any skill course and many other courses such as math, science, physics, etc.

Time is running out and perhaps should run out for an educational system which consistently fails one-half of the college students and, in addition, many millions of high school youth.

We must overhaul the system and design programs which are calculated to prepare today's youth as future citizens for the world of work, which demands skilled workers.

These programs will be for urban youth who wake up in the morning and do not have a glass of milk, eggs, and bacon as you have each morning. Some of these youth will not have had a good night's rest or a good mattress and clean linens to sleep on. Some of these students, black, white, red, or yellow, live in shacks, rat- and bug-infested hole-in-the-walls, so to speak, on unpaved streets that are never cleaned. Their mothers get up early to go to work and leave them there to get the morning meal and off to school on time. Educators greet these students as untouchables. These youth cannot be as calm as you or think as you think, for they have seen the problems of want, hunger, poor housing, and under-employment from the time they were born. Some of these youth have lived in those conditions not for days, weeks, or months, but for a lifetime.

If any of you had to live under these conditions for only two weeks, you would never be the same again. Motivated teachers have compassion for these youth, they love them and put their arms around them, even if they have an odor. If teachers cannot do this, they have no business teaching. Society has been the promoter of the city youth problems.

It is widely believed that the black children lag in school because they are members of a minority group. Experts in schools suggest that they may do so because that is what their teachers expect of them. Robert Rosenthal and Lenor F. Jacobson worked in this area. One of the central problems of American society lies in the fact that certain children suffer a handicap in their education which persists throughout life because of their teachers.

It seems to me that the interaction of teachers and their pupils is the key to many students' success. A teacher's tone of voice, facial expressions, touch, and posture may be a means to unwittingly communicate the expectations of their students. Such communication may change many children's conception of what is expected of them.

Many times teachers may visit the homes of urban youth. They may not find familiar aspects of the white culture, such as a book of the month selection, magazines (Harper's), records of broadway plays, classical music, The Atlantic Monthly, or the New York Review. However, they might observe a high level of noise, continuously reinforced by the input from blues and rhythm from a radio station, T.V. program, and several sets of conversations going on at the same time. This observation might lead teachers to assume that homes of black children are very weak in organization and intellectual content, uninteresting, and generally confusing places in which to grow up. Teachers fail to see the intellectual stimulation that is provided by black newspapers, informative rapping about articles in Jet, Ebony, Sepi, and Motown Sounds. Black youth in these homes, who supposedly cannot read, and even pre-schoolers, can sing several rock and blues tunes from memory, and correctly identify the songs of popular entertainers. Educators must capitalize on this knowledge, and it can be accomplished.

Educators, in listening to a Black speak, assume that the city youth's use of non-standard oral English is an example of bad grammar, without recognizing the possibility that they have a valid, legitimate, and alternate dialect. If we ask them to learn a second language called English, then treat it as such.

If educators would stop trying to compensate for the so-called weaknesses of urban youth and capitalize on their strengths, teaching would be more productive.

Teachers who wish to motivate city youth are not satisfied with the one or two students they reach. They are interested in all 18 or 20 students. These teachers will strengthen each student's capacity to choose intelligently and independently what it is they are seeking to learn. They will help each urban youth to find a meaning for themselves and their studies.

Motivated teachers know that there is no difference between a White person and a Black person if their environmental background is similar. These teachers have a definite conception of what they want to teach and see to it that their students are equally resolved as to what they should learn. These teachers represent the interests and passions of city youth in the 80s, and 90s, and the year 2000. They will be aware that courses, discipline, and learning can be instruments of oppression as easily as they can be routes to emancipation. These teachers induce learning and will not close the door to feedback from urban youth. Teachers and educators can operate for years without knowing what failures they are in the eyes of their former students.

To motivate city youth, we must involve them in business and industry, in the problems of society. All boys and girls in Sweden must spend at least two weeks in industry during the ninth year of school.

Innovation is a "must" to successful motivation. It is hard work, but it is most pleasing if you are dedicated.

- There must be individualized instruction or teaching.
- There must be programmed instructions.
- Your tests must be for the individual.
- Lectures must be developed on tapes for individuals or groups.
- There must be small- and large-group discussions.
- Develop color slides and place information on the slides.
- Involve students to make slides and develop information.
- Let students develop filmstrips so that it will be in their language.

- Develop rapport with all teachers (English, math, etc.), so as to have students write their themes on electronics, drafting, or any subject that interests them.
- Let your students correct each other's work, and discuss it with each student or in a group.
- There must be planning conferences with students.
- Let each student know that what he is doing is directly related to anything that goes on in class.
- Let students say anything in writing about you and your course after completion and a grade has been recorded.
- Stick your neck out — conformity is too comfortable.
- Take students where they are in a learning process.
- Influence others, no matter what you do.
- Motivation is being creative.
- The aim of a good teacher is to become unnecessary.
- There is a better way to transmit information than from lecture by mouth — let the students do it.
- Motivation is preparation of materials for different levels.
- Incite men and women to prepare for any job.
- Learn some of the languages of other ethnic groups.

In conclusion, remember that in order for people to be equal to others of the world requires that they be able to communicate information, explore new ideas, and discover the many options that exist in life. The cruelest thing we do to people when we don't educate them properly is to restrict their option, their knowledge of what they might have been or might be.

Since everything we have touched in our environment has been polluted, the only hope we have for changing it is by giving our city youth the tools needed to salvage the mess we are bequeathing them.

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Student-Worker Characteristics in the Urban Society

Neill C. Slack

Three contributions to the field of education are now available dealing with work and worker characteristics. These are task analytic and human attribute approaches that have much to offer the student in an urban-oriented society. The Occupational Analysis Inventory, the Work Dimensions and the Human Attribute Requirement inventory can be a key in the making of a student's educational experiences relevant to current and future life performances.

A series of studies originating at Purdue University in the past decade under the direction of Ernest J. McCormick initiated an analysis of the characteristics or attributes of work. More recently this has been extended through the efforts of J. W. Cunningham at the Center for Occupational Education at North Carolina State University. The intent or direction of these studies has been to identify a set of elements or attributes of work that differentiate occupations from one another. Just as the domain of psychometrics differentiates a set of attributes that distinguish one individual from another, so the differentiation of attributes (elements) of occupations is needed in our complex, technologically advancing society.

ERGOMETRIC APPROACH

McCormick proposed the characterization of jobs in terms of their levels on quantitative work dimensions. The profiling and development of quantification or levels by scores would thus be analogous to the psychometric principles for people.[1] The characteristics of work and their organization into a systematic approach for use in curriculum and guidance has been the chief aim of Cunningham in his series of studies. He termed the application of psychometric procedures to the study of human work "Ergometrics." ("Erg" derives from the Greek word "ergon," meaning work.)

> This field of investigation would draw from theories and principles of human behavior, as well as from established procedures in psychological measurement and job analysis. It would deal with at least four basic kinds of problems:
>
> (1) The definition, quantification, and classification of work variables;
> (2) the establishment of relationships between work variables and existing measures of human attributes (e.g., tests, in the cognitive, psychomotor, and affective domains);
> (3) the development of measures of work-related human attributes, or behavior potentials (such as vocational ability tests and interest scales);
> (4) the study of the nature of the relationships among various work-related variables.[2]

This systematic approach would then deliver information on levels of proficiencies and profiles of jobs similar to those with which we are so familiar for human attributes. The profiles would be such that we could interpret them for work much as we have in measures of aptitudes and achievement in the cognitive and psychomotor areas of the General Aptitude Test Battery and the Differential Aptitude Tests. Such a systematic approach should have the following characteristics:

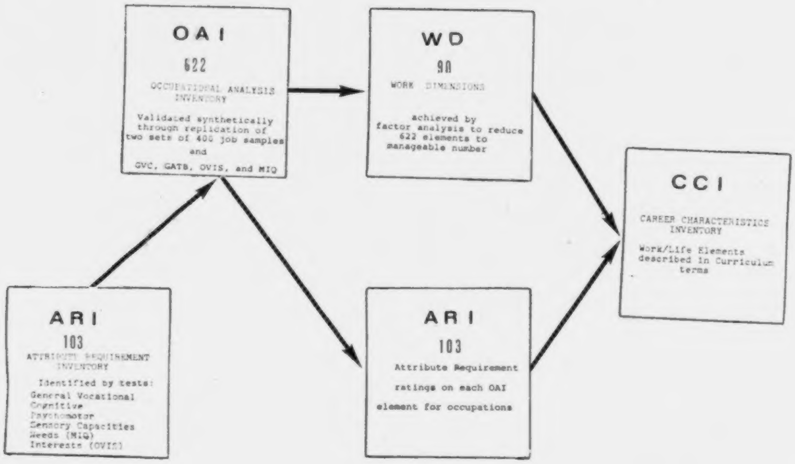
> (1) its conceptual structure should be derived from established principles and theories of human behavior;
> (2) it should deal with work at different levels of complexity ranging from occupational categories to rather narrow classes of tasks and task characteristics;
> (3) it should identify developmental progressions in the acquisition of task capabilities, from a beginning with classes of relatively simple tasks learned in childhood and extending through classes of occupational tasks;
> (4) its elements, or descriptors, should be general enough for application to a variety of occupations, and yet specific and concrete enough to have curricular and other educational implications;
> (5) its elements should be linked to human dimensions for which there are standardized measures; and
> (6) it should provide information that can be readily transformed into products for educational use (e.g., curricula, guidance systems, evaluation procedures, and tests).[3]

A necessity in incorporating the characteristics and principles above into a curriculum development format is the establishment of the level of specificity at which the job analysis is aimed. Jobs need to be described at a higher degree of specificity than Altman's 24 general vocational capabilities,[4] but cannot be as specific or numerous as exist in the 21,471 definitions in the Dictionary of Occupational Titles. The level was ultimately identified considerably above the general vocational capabilities and close to a level of occupational proficiency.[5]

OCCUPATIONAL ANALYSIS INVENTORY

With these objectives and for the series of studies, three contributions are reviewed. Report No. 3 of the Ergometric Research and Development Series contains an Occupational Analysis Inventory with 622 descriptions of work-activities and condition statements applicable to the general population of jobs. In addition to descriptions, specific examples of each class of work activities or conditions were provided for use in systematically rating jobs and occupations. The 622 elements were grouped under the following major headings corresponding to the concept of the closed loop information processing system, which has been receiving increasing acceptance among psychologists in recent years:[6]

1. Information Received (125 elements)
2. Mental Activities (41 elements)
3. Work Behavior (267 elements)
4. Work Goals (112 elements)
5. Work Context (77 elements)


OAI
622
OCCUPATIONAL ANALYSIS INVENTORY
Validated synthetically through replication of two sets of 400 job samples and GVC, GATB, OVIS, and MIQ
WD
90
WORK DIMENSIONS
achieved by factor analysis to reduce 622 elements to manageable number
CCI
CAREER CHARACTERISTICS INVENTORY
Work/Life Elements described in Curriculum terms
ARI
103
ATTRIBUTE REQUIREMENT INVENTORY
Identified by tests:
General Vocational
Cognitive
Psychomotor
Sensory Capacities
Needs (MIQ)
Interests (OVIS)
ARI
103
Attribute Requirement ratings on each OAI element for occupations

Validation was carried out with four sets of criterion variables: Altman's general vocational capability tests, the General Aptitude Test Battery, the Ohio Vocational Interest Scales, and the scales of the Minnesota Importance and Satisfaction Questionnaire.[7]

ATTRIBUTE REQUIREMENT INVENTORY

The second contribution of the ergometric series is most significant as a guidance tool as well as for curriculum development. It consists of a series of rating of the linkages between the 622 elements of the OAI and selected measures of human attributes. These ratings create the possibility of a student being able to compare his individual capability and interest profile through an established relationship to the elements of a job or occupation.

First an Attribute Requirement Inventory was constructed containing 103 definitions of capabilities, interests, and needs. These were selected from standardized measures in the following six categories:

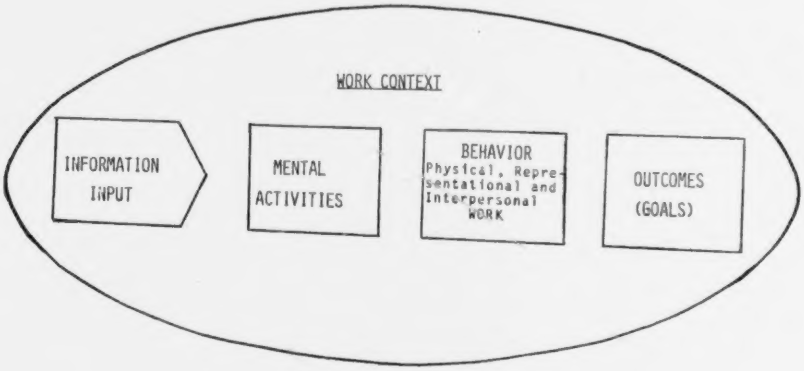
General Vocational Capabilities - Altman -	(24 attributes)
Cognitive Abilities - French et al., GATB	(20 attributes)
Psychomotor Abilities - Fleishman -	(12 attributes)
Sensory Capacities -	(6 attributes)
Interests - OVIS -	(24 attributes)
Needs - MIQ, Weiss et al. -	(17 attributes)

These attributes were selected on a basis of being consistently identifiable, being suitable for analysis purposes, and having easily administered tests.[8]

The result of the study was the identification of the existence of linkages and the degree to which the linkage exists between the 622 work elements of the OAI and the 103 defined and measureable human attributes. The reported series of ratings of the levels or amounts of relationships creates the capability of describing and comparing jobs and occupations for curriculum and guidance usage. This indicates a rating or profile of the job from observable elements (OAI) as well as well defined and testable individual capabilities, interests, and needs. A student could ascertain from his own profile of human attributes those that are compatable or those that vary from his career aspirations.

WORK DIMENSIONS

The third significant contribution of the ergometric research series is the development of combinations of the variables and definition of a more manageable number of basic classes of work activities and conditions. These were termed work dimensions



which mitigated the redundancy among the 622 elements through the application of a factor-analytic procedure.

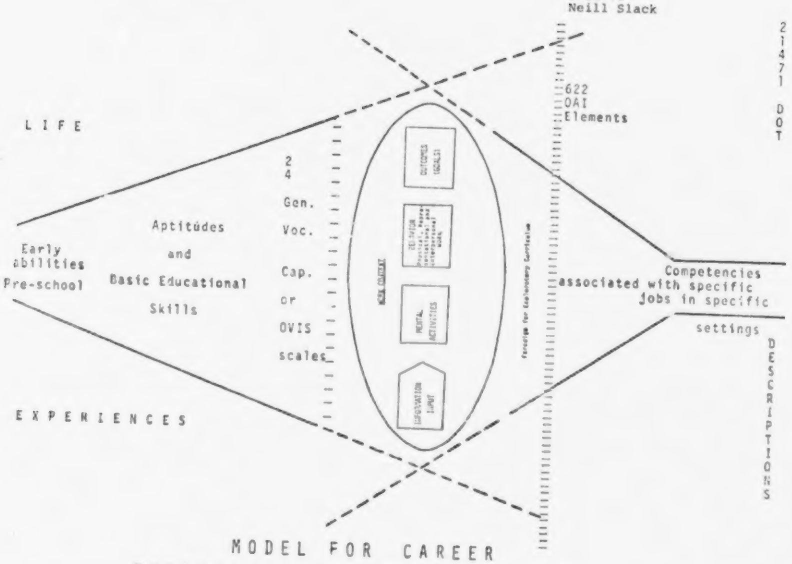
Initially, the Occupational Analysis Inventory was used to rate a representative sample of 400 jobs randomly selected in proportion to the number of jobs within the major occupational categories of the DOT. A follow-up study was conducted with a new sample of 400 jobs to offer replicability testing. All ratings were made from written job descriptions drawn from the files of the United States Employment Service. The data was reported according to seven separate principal components corresponding to the information-processing model of the OAI. These included: information received; mental activities; physical work behavior; representational work behavior; interpersonal work behavior; representational work behavior; work goals; and work context.

An additional objective of this portion of the study was to derive a comprehensive set of work dimensions. Accordingly, a factor-analytic procedure was applied to the data available: the attribute-requirement profile ratings of the OAI work elements and the ratings of the two sets of 400 job sample ratings of the OAI items. Of the 90 work dimensions listed, some reflect coexistence of work elements in jobs and are probably more useful in describing curriculum applications. Those dimensions most homogeneous in attribute requirements may be most applicable for a clustering or profiling needed in guidance functions.[10]

CAREER CHARACTERISTICS INVENTORY

Some current efforts are being made to develop the work dimensions for use in curriculum as a part of the career education exploratory and preparation stages. This involved primarily the writing of new descriptions of each dimension in curriculum terms. This was done with the correlations (ratings) reported for each dimension from the factor analysis. A second effort has been the arranging of the dimensions according to the original "hardware to people continuum" identified by Altman in his general vocational capabilities. Such a procedure has identified several caviates when compared to the 103 items in the Attribute Requirement Inventory. The inclusion or synthesizing of human attribute items which are not represented or are more descriptive than the 90 work dimensions, has tentatively produced a Career Characteristics Inventory (CCI).

In order to differentiate between elements of CCI for curriculum purposes at the career exploration and preparation stages, the closed-loop information-processing sections must be retained. Career exploration will emphasize work goals and work context, but will include elements found in information received, mental activities, and work behavior. These sections have obvious, practical, investigative skills and knowledges that should not be omitted from the exploratory stage. Career preparation, however, emphasizes the opposite sections. Here a student should be identified with a curriculum that presents opportunities to develop skills and knowledges found in the information received, processed, and the work behavior section. The goals and contexts factors representing needs and interests will not be ignored in preparation stages, but will receive attention as mandated by individual needs.


3-15-73
Neill Slack
LIFE
EXPERIENCES
Early abilities Pre-school
Aptitudes and Basic Educational Skills
24 Gen. Voc. Cap. or OVIS scales
OUTCOMES (GOALS)
MENTAL ACTIVITIES
INFORMATION INPUT
WORK CONTEXT
622 OAI Elements
21471 DOT DESCRIPTIONS
Competencies associated with specific jobs in specific settings

MODEL FOR CAREER EXPLORATION AND PREPARATION

The final step in utilizing the information organized by the work dimensions of the OAI is to identify the place in the curriculum where these elements are delivered. A recommendation is to assess the current academically or vocationally oriented courses in the existing curriculum. These are most easily identifiable and available at the local level. The skills and knowledges can then be identified in the courses at the activity or performance level. Using the performance criterion, the degree that the curriculum delivers on each CCI item can be assessed.

This information will provide a two-fold boon to the student, making education more relevant as he compares his goals to work and worker characteristics.

(1) A student can identify, explore, and prepare for the needed elements of a specific job by securing data and comparing the profile of the job to the human attribute profile.
(2) A student can build his own career information data base on worker trait groups, working conditions, significant aptitudes, interests, temperament, and qualifications profile based on the dimensions available in the curriculum.

This availability presupposes that a curriculum can be organized on a mini-unit or modular basis which makes the elements readily available to the student. It is also based on the assumption that a guidance system will be built to support the student-centered curriculum. The student will need assistance in developing a data base of his own attributes and capabilities. He will need a non-penalty system for selecting additional elements or modules to explore or develop interesting or needed skills and knowledges.

SUMMARY

This student-worker oriented curriculum would be an initial means of combining academic, general, and vocational education into a relevant whole for the urban society. The merits of student-worker characteristics are evident in the curriculum potential. It provides a meaningful basis, other than traditional courses and occupational clusters, for organizing the curriculum. Curriculum developers will need to consider pre- and post-instruction, reduce redundancy between courses, and offer a wider variety of career preparation elements. Teachers will be able to contribute more effectively from their expertise in a particular subject matter. It will provide a varied situational-contextual base for each performance objective and a new basis for the clustering of jobs.

In guidance, it will provide a systematic basis for matching students to jobs and learnings. It will be a new means of communicating student progress and status.

For the student, it will offer a flexibility of participation in a variety of careers. It identifies a measureable linkage between instruction, learning, and occupational requirements. Greater assurance of effective preparation relevant to future jobs and technological advances is clearly determined.

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Teacher Education and the Culturally Different Student

Luther Burse

This presentation is entitled "Teacher Education and the Culturally Different Student"; perhaps a more appropriate title would replace "Culturally Different" with the words "Economically Underprivileged," for what we are really talking about when we use these and other such signal words are those students who lack a middle class value system almost always due to a lack of adequate life essentials.

The provision of a functional education for youth who fall into this category is by far the most perplexing problem facing education today. It becomes even more critical when consideration is given to the number of teachers who are adequately prepared to work with such students.

Children from low socio-economic families are taught by middle-class teachers in schools under the control of school board members drawn from society's upper class. These schools are all conscious of the verbal I.Q.'s and because of this have special programs for gifted students. Yet only a few have comparable programs for the economically and intellectually impoverished student.

What is needed now is some fresh approach to the discovery and cultivation of the talents that undoubtedly exist among millions of children from unpromising backgrounds. The usual test won't identify these able pupils; the usual curriculum won't challenge them; the usual teacher won't inspire them. The more urgent need seems to be for creative teaching on the basis of a different set of assumptions.

Vernon F. Haubrich, in an analysis of the crisis in urban education, made the following comments regarding the problem of preparing teachers for inner-city schools (Haubrich, 1966):

> ...today's colleges have a dual handicap in preparing teachers for service in disadvantaged areas. On the one hand, they tend to prepare teachers for children and for schools which are only rarely found in disadvantaged regions. The educational psychology of the middle class child, the methods which one uses in the "good" school setting, and the normal constraints one applies in the typical school setting just will not work in the disadvantaged areas of big cities ....The young prospective teacher has an image of what the task of teaching is going to be, and his home, peer group, and college tend to confirm a vague and general rejection of the disadvantaged.

Statements such as these clearly point to the need for imaginative efforts to devise new techniques for preparing teachers for urban centers. A restructuring in both subject matter content and methods of teaching is urgently needed in our programs of teacher education.

It does not require a serious study of sociological theory to conclude that a teacher will act according to his perceptions of a given situation; furthermore, this principle has significant implications for the modification of teacher education. Prospective teachers attend teacher education institutions staffed by individuals with similar backgrounds and encounter a curriculum generally perpetuating the middle class value system. When these teachers accept positions in urban centers, they often encounter a culture foreign to their own. Too often they find that the values they hold in esteem are unknown to the pupils they teach. For example, honesty may not be considered a virtue. Many pupils may have concluded that lying and deception are necessary for their existence. Stealing may be seen as a necessary strategy in the war between the "haves" and "have nots." Policemen are rarely thought of as community helpers; most often they are viewed as someone to be feared and outwitted. The virtues of thrift and saving may be irrelevant abstractions, and cleanliness may not be next to Godliness for many inner-city children.

If indeed this gulf exists between the experience of the teacher and the environment in which the pupil has been caught, there is an inadequate basis for communication and understanding.

Teachers will tend to see pupils as shiftless, lazy, dishonest, disrespectful, and immoral. Pupils are quick to sense these feelings and may become either antagonistic or apathetic. As a result, the teacher becomes disenchanted and the pupils alienated.

If this lamentable situation is to be corrected, it seems obvious that prospective teachers must be provided with experiences upon which to base realistic perceptions concerning the environment of inner-city children. More succinctly, the prospective teacher's "definition of the situation" must be positively enhanced.

Future teachers need to understand that the problems encountered in teaching the culturally different are not due simply to crowded classrooms or poor teachers. Those factors play a role, but the important lesson the prospective teacher must assimilate is that teaching these children is a special challenge requiring special knowledge. In many cases, teachers and administrators lack the basic theory for understanding the problems in learning encountered by culturally different children.

The starting point is respect. Nothing else that teachers have to give will help very much if it is offered with a resentful, contemptuous, or patronizing attitude. Many teachers do not understand these neighborhoods, these homes, these children, because they haven't respected them enough to think them worthy of study and attention.

How important is all this to the preparation of teachers of industrial arts? When one realizes that for many inner-city youths the industrial arts laboratory is the only vestige of positiveness associated with school, these considerations become extremely significant. Many of these students indicate that shop is the only school subject offering that has meaning for them.

One of the realities of teaching in urban centers is that industrial arts teachers are expected to provide learning activities for a disproportionate number of alienated inner-city youth. This expectation is quite prevalent throughout the United States, despite the fact that the prospective teacher of industrial arts is no better prepared to deal effectively with inner-city pupils than his colleagues.

What then are some underlying assumptions that purport to facilitate an effective teacher preparation program, and how do they relate specifically to the preparation of industrial arts teachers? Dr. Charles Johnson of the University of Georgia, on a recent visit to Cheyney State College, stated (Johnson, 1971):

> ...because of the dynamic nature to our society, new developments in technology, and the recent creation of promising innovations in education, teacher education programs, no matter how recently designed, must continually provide for their self-evaluation, review, and revision. Even recently-designed teacher education programs must take this possibility of need for change with serious concern.

The following assumptions have been identified as basic to teacher education program models reflecting contemporary philosophical, sociological, and psychological thought, as well as providing a curriculum which contains more effective and efficient approaches to teacher education.

1. A teacher education program should have as its base or foundation detailed descriptions of the behaviors or competencies essential to effective teaching, and pre-service and in-service teachers should be guided toward acquiring mastery of them.
2. A teacher education program should provide for differences among teachers, both pre-service and in-service, in the accumulation of experience, extent of achievement, and rate and style of learning.
3. A teacher education program should provide for the development of the personal qualities of the individual learner; it should provide opportunities for him to establish his self identity; and help him pursue his personal objectives.
4. A teacher education program should recognize the changing nature of society and its values and provide for these changes through frequent up-dating and revision of its content and organization.
5. A teacher education program should be developed and managed by modern systems technology.
6. A teacher education program should be so organized that it provides for the continuous evaluation, feedback, and revision of all of its component parts.
7. A teacher education program should provide for the continuous growth and development of the teacher, both pre-service and in-service, from the earliest entry point into the program through the highest level of specialization.
8. A teacher education program should be organized and managed so that all persons concerned with the education of teachers or affected by it share the responsibility for it.
9. A teacher education program should include in its base or foundation detailed descriptions of the behaviors or competencies essential for the teacher to meet his obligations to society and to assure him his freedom as a citizen.
10. A teacher education program should prepare teachers to assume contractual responsibility for the progress of each learner under his guidance toward specified objectives.

The question then arises, what characteristics of implemented programs would fulfill these assumptions? Such programs must utilize:

1. A performance-based mastery criteria.
2. Open student admission and exit behaviors
3. Individualized instruction
4. Team teaching
5. Modularization of content
6. Humanization, personalization, and negotiation of objectives
7. Relevance.
8. Systems analysis
9. Program planning and budgeting systems
10. A differentiated staff
11. Program evaluation and review techniques
12. Scheduling technology.
13. A regenerative program model
14. Program evaluation, review, and revision

15. Program continuity
16. A career sequence
17. Reciprocal provision for transfer
18. Multi-institutional responsibilities
19. Competency-based certification
20. Competency-based liberal education
21. A system of accountability
22. Learning centers
23. Community-based education.

The latter two characteristics provide an extended dimension to teacher education that is critical to effectively teaching industrial arts in the inner-city schools. (Learning centers and community-based education.) Many essential performance behaviors required of teachers of the economically disadvantaged must come from a community-based education and must be obtained at learning centers in the urban community. What I am suggesting, then, is that pre-service industrial arts teachers interested in working with the economically disadvantaged child should complete a student teaching internship which will provide, in addition to the traditional teaching behaviors, experiences designed to create and foster positive and effective learnings in industrial arts which will not be negated by the surroundings in which these learnings take place. The following teaching behaviors are prescribed for such experiences; many of these behaviors require that the pre-service industrial arts teachers get into the community, the school, and laboratory long before they are assigned to student teach there.

SCHOOL AND COMMUNITY RELATIONSHIPS

1. Given an established school organization, the pre-service teacher will identify the formal and informal power structure within that organization and develop and maintain a role definition for himself which will create instructional improvement within that organization.

2. The pre-service teacher will describe the functions of the following individuals in a school system: a) superintendent of schools, b) principal, c) curriculum coordinator, d) speech therapist, e) guidance counselor, f) school psychologist, g) assistant principal, h) dean of men, i) dean of women, j) business manager, k) department heads, l) teachers, m) aides, n) maintenance staff, o) school nurse, and p) food service personnel.

3. In cooperation with some or all of the personnel listed in objective "2," the pre-service teacher will work as a member of a professional team for planning a suitable educational program for industrial arts students.

4. The pre-service teacher will state the relationship between his physical appearance and the attitudes his appearance may create on the part of students, teachers, other school personnel, and community representatives.

5. The pre-service teacher will list the purpose, services, locations, and representative of at least three organizations in the community concerned with the education of youth, and define the role of industrial arts within that organization.

UNIQUE STUDENT QUALITIES

1. The pre-service teacher will recognize the individual differences in the physical, mental, and social traits of each student and make provisions for them, as evidenced by his personal rapport with each student.

2. The pre-service teacher will demonstrate his understanding of student individual differences and this relationship to the learning process by his approach to each student and the manner in which he assists the classroom teacher in specifying an individualized program for each student, appropriate to that student's learning style.

3. Given a student with a specific ability level and interest and an instructional objective, the pre-service teacher will select and use instructional materials and references for the objectives suited to that student's instructional level and interests.

4. The pre-service teacher will demonstrate his provision for individual differences in his instructional plan by the utilization of a series of alternative learning experiences for a group of students to achieve any one objective.

5. The pre-service teacher will express freely his feelings about his experiences in his community, about poor people, black people, white people, and other ethnic groups.

6. Given a disadvantaged child in an inner-city school, with a negative attitude toward the school environment, the pre-service teacher will describe the possible life situation of that child, and how this situation relates to his learning processes and attitudes toward the school environment.

7. The pre-service teacher will describe the effect of various styles of his behavior on others and the effect of other individuals' behavior on him.

8. Given a list of teacher characteristics, the pre-service teacher will rank, in the order of importance, those teacher characteristics which positively affect success in teaching and those characteristics which specifically detract from success in teaching.

9. The pre-service teacher will prepare a list of desirable and undesirable teacher and student characteristics and relate this to the motivational and attitudinal pattern of the learning theory to which he subscribes.

10. The pre-service teacher will develop a teaching style and classroom atmosphere that will place emphasis on student growth and development, rather than presentation of subject matter.

11. Given a classroom situation, the pre-service teacher will establish and maintain a classroom atmosphere that will encourage learning and not permit any student to disrupt the activities of others.

12. Given a classroom situation, the pre-service teacher will demonstrate his ability to win the trust and approval of the students, as evidenced by the degree of honest mutual interaction between teacher and students.

13. The pre-service teacher will develop a teaching style which will stimulate and maintain student interest throughout the instructional process.

14. The pre-service teacher will develop a teaching style that will motivate the students to achieve the objectives of the course, measured by the degree to which each student does perform as expected.

THE GUIDANCE FUNCTION

1. The pre-service teacher will state the role and function of guidance within the total industrial arts program.

2. The pre-service teacher will state the responsibility and relationship of the industrial arts teacher to the total school guidance program.

3. The pre-service teacher will list at least four general sources of occupational information, and state the advantages and disadvantages of each.

4. Given a copy of the Dictionary of Occupational Titles, the pre-service teacher will state the function of this resource, describe the numbering code, and utilize it to obtain specific occupational information to help the students.

5. Given an occupational counseling situation, the pre-service teacher will compile and use occupational information from a number of sources to help the students.

6. Given an occupational counseling situation, the pre-service teacher will work with the student to analyze his personal aptitudes, abilities, interests, and liabilities, and apply these to help define an occupational area for the student.

7. Given an instructional situation, the pre-service teacher will assist students in identifying and resolving problems, both personal and educational, when requested by the student.

8. Given a student with a personal, occupational, or educational guidance problem, who seeks the aid of the industrial arts teacher, the pre-service teacher will interview and counsel the student to the student's satisfaction.

In summation, what I have attempted to demonstrate is that there is a real need for a specialized teacher education program directed toward preparing teachers for working with culturally different children. This program should be interdisciplinary, enabling education majors to integrate courses in many fields. The program should also be urban-centered; that is, concerned with problems of urban migration and redevelopment. It ought to include an intensive understanding of the nature of the city as viewed by the urban sociologist, the housing expert, the student of government, the economist, and so on. The pre-service teacher might be required to select courses from a list such as the following: minority groups, delinquency and criminology, municipal government, social psychology, applied anthropology, urban sociology, Afro-American history, labor economics, labor history, and industrial psychology, along with his industrial arts technical content and methods courses.

Knowledge and understanding of the deprived cannot come from courses and books alone, although their value should not be underestimated. Field experiences can be particularly valuable, especially when they are carefully discussed and absorbed. Such experiences might include visiting P.T.A. meetings, community centers, schools or classes where some of the problems have been dealt with successfully, fraternal groups and social clubs, or working with individuals such as ministers, social workers, and other individuals involved in community efforts.

Needless to say, such pre-service experiences will demand much more of the pre-service teacher than is normally required. He will, out of necessity, have to become a viable part of the community in which he teaches. To do less will eliminate any possibility of acquiring the aforementioned teaching behaviors. It will require a restructuring of existing program components and in some instances will require unspecified periods of internship.

However, the educational neglect of the children who most need special assistance has created what is probably the most critical social problem facing this nation. We would all agree that to do less would be unworthy of the ends we seek.

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The Student in the Inner-City

Charles A. Grace

For the last decade, people have been labeling the inner-city group of our society as culturally disadvantaged, culturally deprived, educationally deprived, culturally different, etc. It seems that the situation today has not changed to any significant extent from the previous decade.

Low wages are still paid workers from the ghetto areas. It is not surprising that many families receive some sort of public assistance; unemployment insurance and Aid to Families with Dependent Children are a couple of examples. Many ghetto men leave their families so that the family can receive welfare. The father is not deserting the family, just not living in the same quarters as the mother and children. What this does is provide for a second income. Yet the median income of female-headed ghetto households, including welfare receipts, added to the median individual income of "unattached" adult males, is still less than $4,000.

Bennett Harrison reports that, in 1966, ghetto families with both spouses present received only about $3,500 in gross annual income. This is about $2,500 below the benchmark set by the United States Department of Labor as a minimum budget of an urban four-member family, a bare minimum budget which provided for a cheap rented apartment, an eight-year-old automobile, and a diet consisting largely of starchy foods and dried beans.[1]

Most of us in the educational profession today are aware that the youth who grows up in the inner-city of our large metropolitan areas differs to some extent from the national norms of his peers in other social settings. There has been a vast amount of writing published on this subject. The literature has focused on practically every aspect of his life—his nature, his family, his economic circumstances, and his educational patterns. We cannot afford to neglect these individuals.

It seems that everyone wants to talk about what should be done for poor youth, but few people are practitioners. These youth need help and guidance in order for them to develop to their highest potential.

Before we go any further, it might be wise to investigate just who and what are these youth. As for who they are, Brottman says that they consist mainly of Blacks, Appalachian Whites, Puerto Ricans, Mexican-Americans, and Indians.[2] We cannot say that we will find a smattering of these ethnic groups in every large metropolitan area; different cities in different localities have groups that predominate. For instance in New York, Detroit, and Chicago there are large concentrations of Blacks and Appalachian Whites. New York and Milwaukee have a large influx of Blacks and Puerto Ricans, while Los Angeles and San Francisco have a large minority population of Mexican-Americans.

When Havighurst refers to these youth as socially disadvantaged, what he means is that they are disadvantaged when comparing them to other youth in some other social setting. He says that these youth are disadvantaged to the effect that when they become adults they will not have a competent and satisfying life.[3]

Just what happens to the youth in the inner-city that develops incompetent adults? Basically, it is their environment. The young children many times are not exposed to games, toys, and books. The home itself is usually drab and without proper furnishings. The sparsity of objects that the child has to manipulate leads to the child being underdeveloped in coordination of hand and eye skills. This would hamper his development in discriminating between colors, as well as sizes and shapes.

The inability of many inner-city mothers to communicate concepts, to share information, and show their children how to perform simple tasks is also a hindrance to the youth's education in the home. She may be unable or be too busy with other tasks or children to get her child to manipulate objects such as puzzles or games. She may simply give the child the object and say, "Here, play with this."

If a child isn't furnished with information to stimulate his interests in his first few years of life, his later school development is hampered greatly.

Joan I. Roberts, in a study of underprivileged children in New York City, found that there were numerous children in grades three through six who had never had a birthday party or been to a birthday party for another child. She also found very few children who knew their own birth dates.[4] I contest, and I think most people will agree, that the birthday celebration for the child is his assurance that he is an individual and a part of the family structure.

Mrs. Milan C. Brenkus says that inner-city children understand what they have been commanded to do but do not understand why they were commanded to do it. The child may never have it explained to him that what he has been told to do is for his own good. He will simply do what he has been told to avoid punishment. The child will not develop a reason or conscience of his own in the matter. In this subtle kind of way, says Brenkus, verbal patterns, or the lack of them, can virtually affect a child's whole thinking process and the ability in the child to verbally describe his wishes, conflicts, and frustrations. These children point rather than name or describe; hit and fight rather than argue or persuade.[5]

Some of what is taught the children of the poor is radically different than what is taught in the middle class. Ruth Shoni Cavan states that the objective in the development of the child is to become a tough, hard-fisted individual who can compete in personal combat in order to support his rights and privileges. Middle class children are taught to fight in order to protect themselves only. These children of the poor are not taught to wait until struck before they fight, but to strike first.[6]

Children of this culture start their school years handicapped. They are handicapped because they have not developed the need for achievement. As these children progress in school, it becomes extremely hard for them to grasp the importance of schooling. Edith G. Neisser says that parents handicap their children even more when they tell them that the lessons they will learn by a part-time job will be more important to them than the schooling they are getting.[7] Parents of these children have had limited educations themselves and therefore are poor examples for their children. These parents must learn to have more inter-action with their children and help their children overcome these handicaps of the inner-city.

The learning environment of urban youth is different from that of suburban youth. Only the learning environment is different, because urban youth learn through the same senses as other youth. Because of existing measures of learning capacity and intelligence, the inner-city youth experiences many special personal adjustment problems and difficulties.

Youth from inner-city families tend to score low on intelligence tests. In Harlem, older children have actually tested lower in I.Q. tests than when they were younger. Most I.Q. tests are concerned with language ability, and families of the poor do not read as much as families of the more affluent classes. A concrete language is usually used in the families of the inner-city. This makes it difficult for their children to understand what teachers are talking about.

Riessman, Crow, Murray, and Smythe have stated that their developmental patterns are characterized by numerous deficiencies. They lack adequate self-concepts, good physical health, realistic perceptions of the future, occupational information, and knowledge of the world of work. They are also deficient in stable family influences, attitudes, and values conducive to satisfactory career preparation, positive peer-group influences, adequate role models, learning skills – particularly those involving language facility, the capacity to carry out long-range plans, sufficient financial resources, and life-styles which are idea-oriented rather than thing-oriented.[8,9]

Gallington has defined six areas that tend to characterize the behavior of disadvantaged youth: withdrawal tendencies, poor achievement, resentment of authority, loitering, rejection of school, and delinquent behavior.[10] I believe that these characteristics can be applied generally to inner-city youth. These youth withdraw from contact with others whose life styles are different from their own. Youth with other life styles would reject the inner-city youth, anyway. This withdrawal and rejection just perpetuates the situation for the inner-city youth, for then he only associates with others of his environment. This withdrawal leads to poor achievement. By associating only with his community peer group, he is deprived of those experiences which would help him improve his in-school achievement and help him develop to his highest potential.

The majority of inner-city youth do not achieve as high academically as they should. Most inner-city schools still teach the same subjects as suburban schools and teach them in the same manner. These subjects and methods are middle-class-oriented and alien. Inner-city youth do not perform on low achievement levels because they have minimal mental capacity, but because the educational system to which they are subjected is not oriented to their society.

This poor academic achievement then leads to resentment of authority. They resent teachers because they perceive them as outside their group. They become suspicious of adults in general, because in this environment the biggest and strongest rule. They probably have been physically abused and restrained by their parents. They become suspicious and resentful of those in authority, such as policemen, principals, and teachers.

Loitering seems to be the national passtime of inner-city youth. Within many of our large cities, poor families are contained in large high-rise apartment projects. The youth loiter in the dark staircases of these maintenance-neglected buildings and shoot crap and play cards. The streets are their playgrounds. In almost any of these projects, one can go and see youth sitting and standing on the street corners with seemingly nothing to do. In so doing, they become acquainted with the local street walkers, pimps, and pushers.

This loitering many times leads the youth into delinquent behavior. The first forms of this delinquent behavior may be swiping an elderly lady's purse or rolling an old wino. Many times, these early delinquent acts serve as a means of getting pocket money. But too many times, these acts lead to such things as auto theft, robbing carry-outs, gas stations, etc. If the youth are with the drug scene, they will perform delinquent acts with more and more frequency. Some of these youth finally get a criminal record which will hamper them the rest of their lives.

Many youth of the inner-city reject the school. They live for the present, not the future. They cannot relate to a curriculum which is mostly middle-class oriented. They are prone to have short attention spans and find it difficult to study from books that do not relate to their environment.

Labov and Robins found that success in school was irrelevant to prestige among their peers. They found that prestige was usually based on such things as physical size, toughness, skill in fighting, verbal routines with girls, and boldness and skill in stealing.[11]

With this in mind, there needs to be tailor-made curricula for inner-city youth. These programs should not be a watering-down of the curriculum that is found in the suburbs, but a different approach to education, keeping the students in the inner-city on a par with students of other social groups.

In recent years educators, social workers, and others have drawn light to the problem of the failure of the public school to provide a transition from the school to the world of work for the majority of youth in slum neighborhoods. Eddy says that this problem has many dimensions. The ones most commonly studied are concentration of the new migrants in particular ghetto areas, the quality of educational facilities and educational personnel in the schools of these areas, scholastic performance on the part of the students, dropping out of school before acquiring those work skills which are necessary to enter the world of work, and the traits and characteristics of those who have a low socioeconomic status in our society.[12]

Sexton compared the schools in lower-income districts versus schools in higher-income districts of a major midwestern industrial center. She presumed that the lower socioeconomic students would have smaller classes, but found that the reverse was true. The higher socioeconomic students had smaller classes. She also expected that the lower socioeconomic students would be assigned the best teachers. She admitted that it is hard to evaluate the quality of teaching. Her method was to compare the percent of not-fully-qualified teachers, those known as "Emergency Substitutes in a Regular Position." In the lower-income group, 17.9% of the teachers consisted of these substitutes, while in the high-income group these substitutes comprised only 5.5% of the teacher population. In addition, the fully-licensed teachers in the higher-income schools tended to have more years of teaching experience and be paid higher salaries than the licensed teachers in the lower-income schools.[13]

Sexton also found that the buildings and facilities used by the lower-income groups averaged about 45 years, while the high-income schools averaged 25 years. When comparing facilities for teaching science, she found that only 2% of the higher-income group schools lacked facilities, compared with 47% of the lower-income group.

Her study led her to conclude:

> A typical upper-income child, then, goes to a school that is safer, more suitable and adequate for his needs, more attractive inside and out, with much better facilities in most subjects, including science, music, art, and library, and also with better lighting, lavatory, and other health facilities than the school attended by the average lower-income child.[14]

In past years, inner-city parents have protested that public formal education is non-functional for their children and is not of the quality of the education found in the suburbs. The black population in particular have boycotted schools. They have kept their children at home rather than send them to inferior schools. Something must be done in order to improve the educational system of the inner-city, to put it on a par with that of suburban areas.

William D. Hitt has said when speaking about education in general that schools should become humanistic. Society is looking at the school for a model. He feels that schools can become model communities.[15] This is so apparent in the inner-city where parents and social workers are looking to the school for help. If schools do not provide the model, then parents will turn to other areas of the society for help.

There has been a tendency for many gifted teachers to avoid the inner-city school. Why? Because they feel inadequate and helpless in the face of overwhelming odds. They do not know how to deal with such things as over-crowded classrooms, language which they consider profane, and the deviant behavior of students.

Another problem that teachers face is the high percentage of turn-over among the student population. Some inner-city schools have a 100% turn-over within a single year. This mobility of the families in the inner-city causes low achievement among the youth.

Schools and communities must work together in order to alleviate the problems. Parents who are willing to help could be used as volunteers and aides to teachers. This practice is taking place in many parts of the country. Teachers and parents should work together in curriculum development. Teachers should have released time to work on curriculum development, to do research and communicate with "experts," and to make home visitations.

For years it has been known that teacher education does not prepare the beginning teacher to teach inner-city students. It is also known that beginning teachers who accept positions in urban centers most likely will be placed in the inner-city. The reason for this is that tenured teachers want to escape to the more affluent schools. It is very important that prospective teachers get experience early in their collegiate studies in inner-city schools, as well as in suburban and rural areas. Just because a teacher cannot succeed in the inner-city is not to say he will not succeed in some other setting. To deprive a prospective teacher of that right to achieve success in some other social setting would be unfair.

Collegiate students should have the opportunity to work with social workers and other leaders in the inner-city. They could work with teachers as teacher aides and help with developing instructional materials. To wait until the beginning teacher has a full-time position in the inner-city to provide him with the experience of such a setting is not only wrong; it is immoral.

What does the challenge of the inner-city mean for industrial arts? Industrial arts is a unique part of the curriculum because industrial arts can make a major contribution to enrich the student's self-esteem and provide him with information about the world of work. Industrial arts gives the student hands-on activity that he does not receive in other disciplines.

The students of this society know nothing about our industrial society. Few fathers or mothers of the inner-city work in what could be classified as industrial occupations. They accept menial low-paying jobs that have very little lasting security. With these types of parents, the youth do not know about the numerous jobs that would become available to them if only they would stay in school and receive a diploma.

Industrial arts teachers must pick up this loose end and provide occupational information for their students. Field trips could be taken to various industries. Speakers should be provided from industry, for instance; union workers as well as those in managerial positions should be made available. Students should be instructed in how to go about applying for industrial jobs, and how to dress and talk when being interviewed. It should also be pointed out to them that their future employers may look closely at their school attendance record before hiring them.

These are only a few examples of the type of education inner-city youth need. Society in general and education in particular must work to alleviate the problems of educating the youth in the inner-city.

FOOTNOTES

(1) Bennett Harrison, *Education, Training, and The Urban Ghetto* (Baltimore: The Johns Hopkins University Press, 1972), 81.

(2) Marvin A. Brottman, "Dimensions of the Problem of the Disadvantaged Pupil," in *Teaching the Culturally Disadvantaged Pupil*. Edited by John M. Beck and Richard W. Saxe (Springfield, Ill: Charles C. Thomas, 1965), p. 17.

(3) Robert J. Havighurst, "Who are the Socially Disadvantaged," in *The Disadvantaged Child.* Edited by Joe L. Frost and Glenn R. Hawkes (Boston: Houghton Mifflin Co., 1966), p. 16.

(4) Joan I. Roberts, *School Children in the Urban Slum* (New York: The Free Press, 1967), p. 188.

(5) Milan C. Brenkus, *My People* (Cleveland: Inner-City Protestant Parish, 1967), p. 19.

(6) Ruth S. Cavan, "Lower-Class Families," in *Education and Social Crisis*, Edited by Everett T. Keach, Jr., Robert Fulton, and William E. Gardner. (New York: John Wiley and Sons, Inc., 1967), p. 54.

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(8) Frank Riessman, *The Culturally Deprived Child*. (New York: Harper & Row, Publishers, 1962), pp. 25-35.

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(11) William Labov and Clarance Robins, "A Note on the Relation of Reading Failure to Peer-Group Status in Urban Ghettos" in *The Causes of Behavior: Readings in Child Development and Educational Psychology*. Edited by Judy F. Rosenblith, Wesley Allinsmith, and Joanna P. Williams. (Boston: Allyn & Bacon, Inc., 1972), p. 282.

(12) Elizabeth M. Eddy, *Walk The White Line: A Profile of Urban Education*. (New York: Doubleday & Company, Inc., 1967), p. 45.

(13) P. Sexton, Education and Income. (New York: Viking Press, 1961), p. 130.
(14) Ibid., p. 132.
(15) William D. Hitt, Education as a Human Enterprise. (Worthington, Ohio: Charles A. Jones Publishing Co., 1973), p. 61.

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Social, Cultural, and Career Perspectives of Industrial Arts in the Urban Environment

Julius Paster

Far too frequently public education and teacher education have been censured for the problems, evils, and over-all anxieties that beset the urban environment. This observation was strongly stated by Commanger:

> Many of the failures we ascribe to contemporary education are in fact failures of our society as a whole. A society that is indifferent to its own heritage cannot expect schools to make good the difference. A society that slurs over the fundamental principles and takes refuge in the superficial and the ephemeral cannot demand that its schools instruct in abiding moral values. A society proudly preoccupied with its own material accomplishments and well-being cannot fairly expect its schools to teach that the snug warmth of security is less meaningful than the bracing venture of freedom. In all this, to reform our schools is first to reform ourselves.[1]

All major cities in the country are facing new social and economic challenges. Problems are varied and complex. Vexing questions dealing with the environment, crime, welfare and taxes, housing and health, race relations, transportation, limitations of governmental jurisdiction, and education cannot be appraised or resolved in simplistic band wagon approaches. These multitudinous questions circumscribe the urban crisis. The urban condition is not confined to the schools, and the schools in and of themselves cannot be charged exclusively for generating or solving the urban crisis. Political expediencies too frequently single out the schools as the dominant force for reversing the socio-economic dilemmas of the city.

During the past decade, the attention of public educators has focused with increasing intensity and sharpness on the problems of the big city schools; so much so that a special term, "urban education," has come to stand for the complex difficulties accompanying the school's attempts to prepare the city slum child for an overwhelming technical society in a state of rapid change. Whatever set of terms we apply to these children, "the disadvantaged," the "underprivileged," "the socially handicapped," we are talking about those who, in the midst of affluence, grow up in the rotten depths of the city, despairing poverty, with little hope for the future, and often bearing insurmountable stigma.

One problem of urban education arises because of the dislocations related to movements of large numbers of people to alien places. An influential migration, as it can be called, has been the movement from the rural South to the urban North. This creates the problems of personal adjustment, alien life styles, new values, and linguistic differences tantamount to learning a new language. Another so-called migration has been the movement of a large number of people from Puerto Rico to the city. Yet another important movement occurs from within our cities. It can sometimes be gradual, but more often it is a very rapid shift of the middle class to suburban areas and the consequent stratification of areas within the city into single-class, ethnic, or poverty sections.

The changing character of the city has produced changes in the demands made of the urban school and its way of responding to these challenges. Ethnic differences among the city residents have been replaced by sharpened racial tensions. Ghettos remain a part of the city. Today these ghettos, which in former years held immigrants to our country, are filled with Blacks, Puerto Ricans, or with a newly emerging white middle class. For certain the tenement-lined neighborhoods of the city are ghettos, but so are the exclusive tree-lined streets of the white populace. How we can break down these invisible walls between these ghettos is at the root of our problems with urban education. Much of the violence that accompanies racial divisiveness has been focused upon the school, and today the urban school appears to be the primary center of racial conflict. How and when we learn to cope with this strife will eventually prove our assumptions regarding urban education right or wrong. We must believe in stressing the purpose and value of the urban school system. Society expects the schools to make their students literate, productive citizens of our city. Education must instill an understanding not only of city problems, but those facing all of us. The school must become the social agency through which the student learns of his nation and the world in regard to himself and his community. If the schools cannot reach their pupils, they will have failed not only themselves, but also their students. The economic reaction thus created further hampers the mission of public education in the city.

In discussing as broad and vast a topic as the "Social, Cultural, and Career Perspectives of Industrial Arts in the Urban Area," one can barely hope to touch all the ramifications implicit within urban education. Generalizations tend to lose sight of unique problems in New York City, Chicago, Detroit, Watts, St. Louis, or Washington, D.C. I suspect too, that the social, cultural, and educational difficulties inherent within our major cities also manifest themselves in the rural South, Appalachia, the Southwest, and even in places such as Wounded Knee. In a recent report (March 19, 1973) issued by the United States Civil Rights Commission dealing with Mexican-American education, the following was noted:

1. Teachers praise or encourage white children 36% more often than they praise Chicanos.
2. Teachers use or build upon ideas and suggestions from white children 40% more frequently than from Chicanos.
3. Teachers respond positively to white youngsters 40% more than to Chicanos.
4. Teachers ask questions of white students 21% more often than they do of Chicano children.[2]

This lack of verbal interaction between ethnic students and teachers in schools of the Southwest provides an echo of the many studies and reports dealing with the educational scene in the urban areas.

One may well identify several hypotheses with respect to the influences of culture and social environment on school achievement.

1. Social class into which a child is born influences learning.
2. Ethnic background of a child has an effect on the way he learns.
3. The place where a child lives, his neighborhood, is a factor in the learning experience.
4. The occupations and the people who surround a youngster make a difference in learning receptivity.
5. Family values and patterns influence learning in overt and subtle ways.
6. Family life styles and interests influence the quality of a learning experience.

In the urban setting, there are numerous social and cultural resources for enriching the lives of youngsters. Exposure to the theatre, museums, ballet, symphony orchestra, botanical gardens, industrial visitation, transportation services, communications media, or the construction of a high-rise building can serve as exciting motivational inspirations for learning within and beyond the school. Value orientations may be modified by authenticity of experience, action, and knowledge.

Recently, I visited a new school within a distressed urban area. It was a fortress-like structure with small windows to minimize vandalism. The ethnic composition of the student body was 85% Spanish-speaking and 15% Black. The latest reading scores indicated only 22.6% of the students capable of reading at their grade level. Half the students are from broken homes, and 70% are from families on welfare. There appeared to be the same earnest approach to teaching and learning as one may find in the schools of the city's middle-class neighborhoods. As I walked through the corridors to reach the industrial arts facilities, I noted with interest the display of terminology in various classrooms.

These terms included: environment, committee, research, computer, and consumer awareness. My enthusiasm waned upon entering the woodworking class. Perched rather conspicuously on a bulletin board was a developmental teaching aid bearing the caption, "Smooth - Straight - Square." It appears paradoxical that a curriculum area capable of animating the human aspects of technology today was perpetuating a skill and exercise approach of yester-years. The teacher of industrial arts is a rather unique and versatile individual. However, in some instances he has inherited, via tradition and teacher education, a prefabricated kit of content and methodology that have withstood social, economic, and technological change.

The problems within urban schools are deeply rooted amid the human problems in our cities. I am not entertaining the idea that industrial arts education, regardless of definitions that may be ascribed to its function in the schools, possesses the rational alternative to attain quality education. However, in the urban area many industrial arts programs serve a custodial function for those youngsters that display minimal academic ability. To the amazement of the academic establishment, and to the credit of industrial arts teachers, many of these students for the very first time achieve recognition, gratification, and a feeling of success.

Too frequently, industrial arts teachers become prisoners of their respective discipline areas. This may well reflect a genuine sense of enthusiasm for the subject field. The plane, lathe, drawing board, offset press, potter's wheel, or injection molding press, along with the respective environs, serve as the focal points for learning skill competencies rather than providing the paths for understanding interrelationships of technology, society, and the human condition.

The trend of modern organizational development has been toward more flexible patterns. Many authorities have adopted a different view of modern organizations. William H. Whyte, Jr., in The Organization Man,[3] contends that the modern organization man is above all a conformist. Robert Morton's Social Theory and Social Structure[4] emphasizes the fact that the most marked change in society has been the tendency to bureaucratize procedures, and concentrates on an analysis of the effect of bureaucracies on the individuals who work in them and their relationship toward the public they serve. Melville Dalton, however, in Men Who Manage[5] admits that men's activities are increasingly processed through formal organizations, but claims that the organizations' executives must take the initiative constantly and "be creative more subtly." The tendency toward flexible patterns has led to decentralization of power, or as the British refer to it, delegated responsibility, which in turn has led to more departments, more heads of departments and more confusion.

Our school systems are not like the dead, of which we must speak nothing but good. If some of the evils in our present scheme seem deep-rooted and almost insurmountable, then it is the moral responsibility for those involved in education, and those who pay for education, to seek rational alternatives.

The 'what' in education today is as perplexing as it was in the days of Aristotle. 'For mankind,' Aristotle said, 'are no means agreed about the best things to be taught, whether we look at virtue or the best in life. Neither is it clear whether education is more concerned with intellectual or moral virtue. The existing practice is perplexing; no one knows on what principle we should proceed — should the useful in life, or should virtue, or should the higher knowledge, be the main aim of our training?' The 'what' in industrial arts has been subjected to much debate in recent years. There have been successful endeavors to correlate industrial arts activities with other learning experiences in the school. At this point in time, there is need to extend the scope and mission of industrial arts beyond the immediate environs of the school. We note the extension of school activities in such newer programs as 'Open Education,' 'Open Corridors,' 'Schools Without Walls,' and 'Free Schools.' In teacher education, there is much emphasis on field or community-based activities. Why not extend this idea to industrial arts education on all levels? There is much to do in our industrial arts shops or laboratories, but there is much opportunity to learn about the real world of technology in the communities of urban areas.

Multidisciplinary resource centers emphasizing particular aspects of the curriculum such as the humanities, sciences, and industrial arts can be created at strategic locations in the city to serve secondary students from various schools. Each center would have a library, classroom, demonstration and varied laboratory facilities, multi-media equipment, and related materials for research, exploration, and evaluation. Each of these units, staffed by qualified and enthusiastic faculty, could offer exciting programs in a team effort for participating students. These special offerings would be scheduled several times a week, and students would travel to the resource centers rather than attend their home school.

Another departure from the traditional would utilize the community as a learning laboratory. Cooperating institutions such as museums, computer centers, hospitals, government offices, mercantile businesses, transportation services, industrial plants, and schools would be part of this plan. The program, as envisioned, would provide a variety of real learning experiences developed by teachers, students, and the cooperating institutions. For example, a museum could offer a unique course in the history of invention and technology. A park might offer explorations in ecology and an industrial plant might provide a laboratory for examination of time and motion studies. In addition to lecture, demonstration, and laboratory activities, students would spend time with field specialists in authentic experiences of the city. A multidisciplinary field-based program assumes that learning is a function of student needs and interests. Cognitive, performance, and affective learning would be a natural and direct outgrowth of a student's interaction with people, environment, and authenticity. This approach presupposes a broader involvement of students, teachers, teacher-educators, and the many facets of urban life. Traditional courses can be replaced with urban internships on the secondary level. The internships would be designed to provide students with practical experiences and problems (e.g., construction, production, manufacture, communication, transportation) in urban affairs. It can take a variety of forms, such as the development of a research problem pertaining to some urban project, or practical work experience under the guidance of technical specialists.

Other multidisciplinary internships or seminars, under the direction of industrial arts, humanity, and science teachers, could also move in the following directions:

A. Power in the City — Analyses of the formal and informal participation in the decision-making in the city and the relative control over public policy.
B. Comparative Urban Institutions — A review of private and public institutions which are responsible for the delivery of services and the consequential influences of bureaucratic structures.
C. Technology Influences Upon Urbanization and Institutions — The effects of technology upon urbanization via family, school, transportation, and related services.

Change from the traditional to open and field-based programs will require political acceptability from within and beyond the school. Given the intellectual sterility, traditional structures, and low profiles of achievement in many schools, urban and otherwise; given the English and American experiences with the open-education approach; given the sound psychological rationale for non-authoritarian education, the case for informal education, including industrial arts, is clear and strong. Industrial arts teachers possess the technological competence that can enrich humanistic studies in the urban environment.

The career implications of industrial arts programs must be considered an important ingredient in urban educational programs. It is well to examine some of the statistics dealing with poverty, the unemployed, and relationships to insufficient educational preparation. The Census Employment Survey conducted in late 1970 and early 1971 provides detailed social and economic data on people residing in areas having substantial numbers of families with low income. In conjunction with the Bureau of Labor Statistics, the information sets forth important data for those involved in education. The study clearly identifies characteristics of the unemployed in urban areas. Of particular interest, it is well to note some of the gleanings for the New York City Area:

1. New York City low-income-area families are more likely to be living in poverty as compared to other low-income areas in the United States.
2. Families in the New York City low-income areas had lower annual incomes than families in the United States.
3. New York City low-income-area residents had one of the lowest labor force participation rates, 50.7, compared to other areas in 19 large cities surveyed. Unemployment rates varied from a high of 15.9 for low-income-area residents in San Diego, to a low of 4.8 in Washington, D.C.
4. Low-income-area residents have less schooling.
5. Youth constitute a much higher proportion of the unemployed than of the labor force.
6. With more schooling, employment is more likely; with less schooling, there is more likelihood of unemployment and nonparticipation in the labor force.

7. Those who complete job training hold more desirable jobs than those with no job training.
8. Only one out of every 10 low-income-area residents of working age had completed any job training.
9. Significant job-finding problems of the unemployed were lack of skill, experience, or education.
10. The projected decline in semi-skilled and unskilled jobs in the next decade may affect low-income-area residents more than city workers as a whole.

(Source: Bureau of Labor Statistics, Regional Report Number 30, September 1972)[6]

Children who do not perform up to the level of their capacities, the underachievers, call attention to the need to study the motivational patterns of poor children, their motives for action, their values, goals, and the means they use to attain educational objectives. While many motives may influence academic performance, one of the most relevant and best understood is the need for success and achievement. The process of motivating the pupil to perform school work is sufficiently complex. Yet, the industrial arts program can provide diverse opportunities for achievement motivation and success. While there may be danger in over-simplification, the conditions thought to produce need for achievement include an attractive goal, a moderate risk concerning the possibility for attaining it, a sense of being responsible for success or failure, and knowledge of the results of one's efforts. Successful attainment in industrial arts activities for children of the poor may provide these youngsters with achievement motivation for their academic activities. Or the industrial arts teacher can become a member of a learning team to foster academic achievement via industrial arts.

In the area of secondary education, industrial arts can provide substantive content for pre-occupational or career orientation. Particularly, for those students who may not wish to follow a traditional pattern of vocational education, industrial arts can offer meaningful exposure to technical skills and knowledge. New programs, as mentioned earlier, should be field-based. The urban area provides many resources for the industrial arts program.

In some urban sectors, there may be community skepticism of industrial arts. Perhaps evidences of past or present programs may justify legitimate reservations. To provide for broader communication, industrial arts programs should utilize community advisory committees. The active participation of advisory committees can help focus upon newer directions and support for industrial arts. Industrial arts teachers have a responsibility to stimulate and encourage such community involvement.

Many states are moving in the direction of competency-based education and teacher education programs. This is a step in the right direction, particularly in the area of industrial arts. However, as we prepare learning objectives, within a well-qualified philosophical 'why,' let us remember that performance objectives or the doing/motor skill activities reflects just one approach. In addition to performance objectives, industrial arts teachers should also spell out cognitive objectives, consequential objectives, affective objectives, and exploratory objectives. Under a systems approach, we may be able to program performance objectives via modular instruction in utilizing media or hardware. Perhaps the system may even exceed the services of the teacher. However, in the urban environment, the inter-personal relationships of industrial arts teachers and students should promote a human understanding of technology — with as much emphasis upon the "why" as on the "how to."

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Potentials of Industrial Arts in an Urban Setting

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The subject of this presentation could be appropriately titled, The Future of Schooling and the Role of Industrial Arts in the Urban Society. Although perhaps the new title would be a bit more descriptive of the contents, the emphasis is clear. What is the potential for industrial arts in the urban society? This question immediately raises concerns which bear heavy baggage for our field, as well as the whole range of previously uncontested subject domains in the schools. In fact, the notion of compulsory education itself has come under attack only recently by the proponents of the "free school" movement. Suggestions have been raised which challenge the idea that the school as we have grown to know it is even necessary or desirable in the world of today and tomorrow. I will choose not to deal with our current question of future existence for the schools in general, but rather will proceed to make basic assumptions upon which my succeeding remarks are to be based. Firstly, I do not see a large-scale trend toward "deschooling society," although the predictions of authors including Ivan Illich and John Holt suggest that such a trend is upon us. There are no indicators to substantiate the feeling that society will cast off the historical image of the school which has been nurtured over the years. The evidence is present however, which indicates that educational systems will be required to make certain fundamental adjustments in keeping with changes which continue to occur in society.

The second assumption which I will make, perhaps without reasonable historical support, is that the field of industrial arts will change in accordance with the emergence of a new social order and the corresponding institutional changes wrought in the schools as a result. The question of whether industrial arts will change ultimately raises the spector of professional defeatism and intellectual stagnation which the critics in our field have often raised as a signal of impending doom. My beliefs reflect hope and promise: hope for the emergence of a new concern in our field for a role in the educational future and promise of the potential formulation of the means with which to translate that concern into meaningful educational opportunity in the urban society.

Urban society is clearly the society of the future. All evidence indicates that the trend toward the emergence of a new social arrangement based upon large centers of population and the resulting factors of industrial concentration and therefore economic power cannot be denied. Alvin Toffler, in his outstanding social commentary entitled Future Shock, characterized the growth of the urban culture by using the following perspectives: "We are now undergoing the most extensive and rapid urbanization the world has ever seen. In 1850, only four cities on the face of the earth had a population of 1,000,000 or more. By 1900 the number had increased to 19. But by 1960 there were 141, and today world urban population is rocketing upward at a rate of 6.5% per year. This single stark statistic means a doubling of the earth's urban population within 11 years." (11, p. 22,23) If the present cities of the world were to remain fixed in terms of population figures, the projected growth figures would mean that for every major city in the world we would have to build a duplicate city in order to accommodate the expanded urban population. In America alone, three out of four Americans live in or around cities. The figures for the urban population reflect a rather stable inner-city population level, with most of the present and projected growth occurring in the "outer-city" or suburbs. There is some support for the idea that America is moving toward the development of an urban civilization marked by the absence of traditional cities. Kristol made the following assessment of present and future urbanization in America:

> ...less than 30% of the American population lives in places with a population of more than 100,000, which is what we ordinarily regard as a city.
>
> But in the foreseeable future, we can say with fair certainty that we are moving toward an urban civilization without great cities—and that this movement is so without precedent that prophecies of doom or hopes of utopia are both premature (4, p. 14)

The acceptance of this kind of evidence clearly would lead to the conclusion that many of the social agencies which operate in today's world simply will not provide the kind of services which will be necessary in the urban society. The evidence seems to suggest that the educational system when viewed simply from the standpoint of delivery of services cannot utilize a delivery mode inherited from the previous social arrangement, but must field more productive means of providing its service under altogether different circumstances.

Many critics of today's schools, particularly the urban schools, have cited rather abstract humanistic generalizations about what is wrong with education in America's urban centers. Only a few have presented the kind of hard data which demonstrates underlying discontent and, more importantly, the behavior which results. Doherty related problems in urban education to a basic lack of confidence when he asserted:

> ...urban education is in the midst of an unprecedented crisis of confidence, one that manifests itself in both apathy and hostility. (2, p. 49)

The symptoms of a confidence crisis vary from city to city, but in all cases the crisis clearly exists. Doherty elucidated the following examples from selected cities:

(1) San Francisco Parent Teacher Association membership is down 30% in 1972 from 1971.

(2) 146 principals in New York City (of 900 in the system) opted for early retirement this year (1972) compared to 26 in 1970.

(3) a San Francisco mother was advised to place her child in a private school after approaching a group of fifth grade teachers concerning a problem of boredom. The mother replied, 'It's the ultimate in despair—the teachers have already given up.' (2, p. 50)

Doherty responded to the information he had obtained by declaring:

> ...only the most dramatic and fundamental reorganization can save the nation's demoralized big city school systems. (2, p. 50)

I believe one factor will prove to be of immeasurable importance in the solution to both urban and semi-urban educational problems. The theoretical framework within which the idea of general education is fostered will require reassessment and modification. The sets of assumptions which support the current notion of general education will need to undergo close scrutiny in light of constantly-changing social dynamics. For our purposes, one assumption is paramount.

When one undertakes to discuss the potentials of any educational field in a given type of social setting—i.e., urban, suburban, rural—the unspoken assumption is that the nature of education is or should be different in given settings.

I believe that assumption to be at least partially false. The educational process is or should be predicated upon the idea that humans have a certain set of distinct needs and potentials which should be served. Phillip Phenix in his outstanding work on curriculum entitled Realms Of Meaning stated, "Human beings are essentially creatures who have the power to experience meanings. Distinctly human existence consists in a pattern of meanings. Furthermore, general education is the process of engendering essential meanings." (8, p. 5) The implication of this position is that regardless of where people live, the process of education and at least part of its content should reflect the attempt to arrive at meaningfulness in human existence. Stated somewhat differently, the basic thrust of general education should attempt to foster the students making sense out of the world around them in order to develop a reasonable degree of meaning in life. Thus, when we deal with the broad categories of meaning which are possible, there is little difference between the educational needs of the child in the city versus the child in the rural area. What does differ are the sets of stimuli which make up his environment and with which he interacts in order to make his place in the world. Silverman approached the notion of a different set of needs for students in different social settings by stating: "In essence, I am suggesting that to prepare an urban student for the future isn't any different from preparing anyone else for life itself." (11,p.205) Silverman summarized his position by asserting: "...I am suggesting that we have to stop thinking in terms of education for this or that group, for this or that purpose, and realize that we have a choice of either training children to fit into a system or helping young people to actualize their potential and fully experience living." (11, p.205) The real potential for industrial arts, then, is not how well it can serve in the urban setting, or the rural setting, or in any other setting. The real question to be faced by today's educator is what kind of educational framework will allow the student to maximize his human potential. The second question concerns industrial arts educators. How can we provide a place for students to act on their potential in ways that are unique? The real potential for industrial arts in the urban society is the opportunity to provide leadership for change.

The most logical prescription of a broad framework for general education which I have found was presented by Phenix in Realms Of Meaning. Phenix identified six realms or patterns of meaning. He stated: "Six fundamental patterns of meaning emerge from the analysis of the possible distinctive modes of human understanding. These six patterns may be designated respectively as symbolics, empirics, esthetics, synoetics, ethics, and synoptics." The attributes of each realm are characterized in Figure 1. Each of these realms has particular characteristics which provide that realm with uniqueness. Symbolics comprises ordinary language, mathematics, and various types of nondiscursive symbolic forms, such as gestures, rituals, rhythmic patterns. The symbolic realm provides the means of expression necessary to establish meaning in the other realms. Empirics includes the sciences. Thus, the opportunity for the student to find meaning in the area of descriptions, generalization, prediction based upon observation, as well as the recognition or development of theoretical formulations based upon experimentation and observation.

Esthetics contains the various arts, including the visual arts and literature. Meanings in this realm are concerned with contemplative perception as a means of interpreting subjective experience. The fourth realm, synoetics, involves personal knowledge or knowledge of self. The opportunity is provided for the student to find meaning in himself. The fifth realm is ethics and deals with free, responsible, deliberate decision reflecting interaction with basic moral value systems. Finally, synoptics refers to meanings which are essentially integrative. This realm is represented by disciplines which combine empirical, esthetic, and synoetic meanings into coherent wholes. This realm includes the disciplines of history, religion, and philosophy.

Each of the realms of meaning presented by Phenix may be represented by fields of disciplined inquiry, those areas which represent established fields of knowledge. The term discipline does not mean that new fields of knowledge are excluded because of historical precedence. On the contrary, as new disciplines develop, there should be mechanisms provided in the school to allow students to interact with the unique knowledge and/or mode of inquiry which the new discipline represents. Thus my plea is not for a school curriculum founded on the traditionally-accepted disciplines but rather a recognition of the notion of discipline as knowledge organization and logical progression in thought process.

Phenix and others have identified differences between disciplines based upon their intended function in the educational process. Disciplines may be operationally divided into those which are fundamentally basic and those which are derived. The fundamental studies have a unique body of theory and knowledge independent of other knowledge areas. Those disciplines which are derived have bodies of theory and/or knowledge which are unique in their ability to combine or interpret theory from the fundamental disciplines in new ways. Derived studies also tend to reflect the application of theoretical principles to practical problems. Because one type concentrates on abstractions while the other concentrates on the application of principles to practical problems in no way diminishes

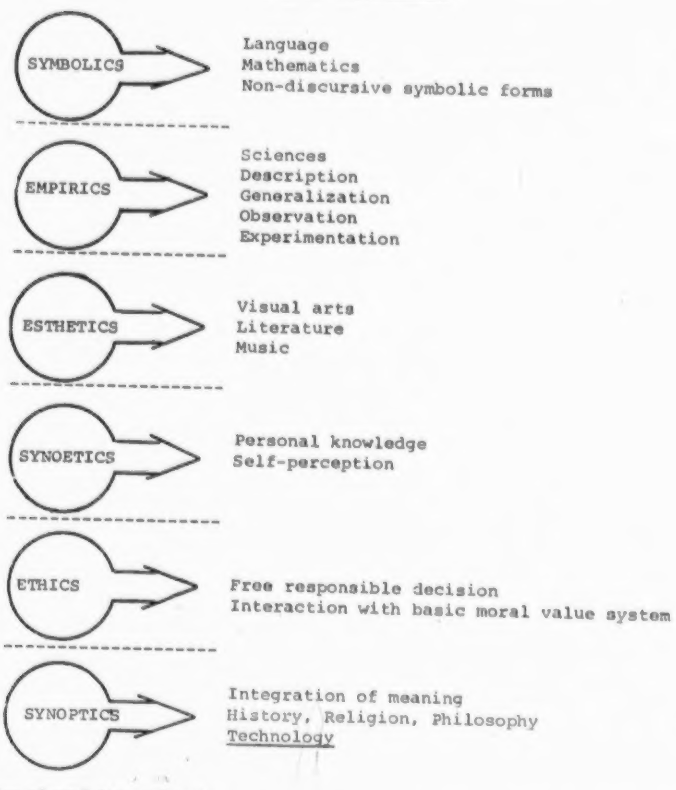
Figure 1.

REALMS OF MEANING

SYMBOLICS
Language
Mathematics
Non-discursive symbolic forms
EMPIRICS
Sciences
Description
Generalization
Observation
Experimentation
ESTHETICS
Visual arts
Literature
Music
SYNOETICS
Personal knowledge
Self-perception
ETHICS
Free responsible decision
Interaction with basic moral value system
SYNOPTICS
Integration of meaning
History, Religion, Philosophy
Technology

the value of studying each type.

The fact that certain disciplines are derived and others are fundamental does not imply inherent intellectual value, but rather an operational emphasis of the disciplines themselves. Therefore one cannot assign a position of distinction intellectually to one type or the other simply because one is more or less abstract than the other. Surely there are people who find greater meaning in knowledge which reflects a basic knowledge organization and thought process which emphasizes the application of abstract theory to the solution of practical human problems.

A well-balanced general education curriculum should present the opportunity for people to study different disciplines, both fundamental and derived. This openness will allow the student to interact with many divergent types of disciplines and eventually find meaning in some and appreciate the substance of others.

The importance of the Phenix discussion is not in the identification of neat little discipline packages which can be inserted wholesale into the school, with every student being required to participate in every discipline. The intent was to describe a broader view of the meaning of curriculum in order to allow moving away from a preconceived notion of the school curriculum as a set of prescriptions for content and toward a notion of curriculum as broadly interpreted arrangement of experience areas through which humans can develop meaning in their lives in different ways. Whether the arrangement put forward by Phenix or some other arrangement is selected as most reasonable, the point is that the educational community will be required to adopt a much more flexible approach to the idea of curriculum and likewise provide a flexible delivery system which is responsive to community needs.

The question for us to consider now can be stated in the following way: where can industrial arts fit into a flexibly conceived curriculum pattern, and what kind of delivery system can be developed to provide for maximum community involvement and opportunity? I have used the word community rather than student in order to imply that the total community can and should participate and benefit from the educational opportunity which the school as an institution offers.

The field of industrial arts has a unique opportunity which no other subject area can boast. Industrial arts, when conceived in its broadest terms, can provide an integrative function in the curriculum which has not been recognized in the past as legitimate. The study of industrial arts as a study of technology can provide the opportunity for the integration of concepts accumulated in various disciplines into a coherent whole which may be lacking unless the opportunity for integration is presented. The study of technology becomes much more than a study of tools and machines — processes and product of industry. The study of technology is a study of the way man has altered the nature of culture by acting in certain ways, in employing unique ways of dealing with physical problems in order to adapt to his environment.

With this kind of conceptual base in mind, let us explore the potential for the field of industrial arts. The question which immediately comes to mind is just what industrial arts will look like in terms of content and educational environment. What are the ingredients which can be blended in order to maximize the opportunity for students? The first factor which provides industrial arts with a decided advantage is the educational environment which we employ. The laboratory holds the key to dynamics in industrial arts. The problem which needs to be overcome is the emotional climate that we have frequently engendered. The notion of a laboratory as a place where creative activities of all types are executed is missing in altogether too many instances. In our rush to identify a defensible body of content for our field, we very often have neglected to take advantage of a loosely-defined network of concepts which inherently could allow us to capitalize on multiple activities by individuals or groups of students without the inhibiting idea that every student should master the same body of content. The fact that we operate in a less formal atmosphere than most school subject areas immediately establishes the opportunity for much greater flexibility with regard to content selection and presentation. Thus, the potential for a flexible approach to content and teaching methodology is present. Only time will tell whether we were forward-looking enough to capitalize on the potential.

The second potential which industrial arts has not fully explored is the ability to provide a given community with a full range of differentiated programs based upon community interest. Somehow the notion that the main function of the school is completed in eight hours, five days a week, has resulted in the inability of the school to provide for a much broader program. Educational accessibility is one of the major criticisms being put to today's school. Often there are so many time restrictions and/or prerequisites placed in the way of people that access to educational opportunity is difficult, if not impossible. For example, a student may be interested in learning something about how a radio functions. The response he may receive, however, is that he first must know about Ohm's law before he is capable of understanding how a radio functions. I do not really believe that this is the case. The opportunity for students to learn Ohm's law and its relationship to electronics theory should be available in the school for those who desire to know it. However, the presence of one thing should not be an inhibiting factor to the presence of other kinds of opportunities. The difference that I am suggesting is one of program objectives. The industrial arts programs in today's schools need to diversify in order to serve the interests of the school population better. At the same time, industrial arts educators will need to fight a long bitter battle with the essentialists in today's schools who require every student, regardless of his long-range objectives, to endure many experiences which very often are indefensible. In order to win that battle, we must offer a program with much wider appeal than we presently offer. Such a program could include the opportunity for individual or group research, independent study courses structured on an individual basis, short-term intensive courses, craft courses of both long and short duration, career-centered courses which cut across all segments of the industrial world, prevocational opportunities, pre-engineering studies, interdisciplinary courses with the physical and social sciences, parent/child cooperative studies, as well as peer team studies. The list is limited only by the imagination of curriculum planners.

Earlier in this presentation, I alluded to the importance of delivery systems which might be utilized, particularly in the urban centers, in order to provide more comprehensive and accessible educational opportunity. The variations in delivery to which I am referring include the following examples (5, p. 86).

small educational parks — combination of small, regular elementary and intermediate schools and facilities which will double as special education centers for students and community centers during non-school hours and on weekends.

small schools — 400-600-seat schools to promote a more personalized learning atmosphere.

scatter sites — small school sub-units located in different sections of a neighborhood rather than a single site school.

multiple or extended use of school buildings — day and night school cycle to serve the entire community more effectively.

Whatever unique techniques are employed to make educational opportunity more accessible, there are obvious goals which we should be moving toward.

John Lindsay characterized the trends in urban education by stating:

> . . . in many areas of the city we are moving from large to small schools; from rigid to more flexible and responsive administration; from a relatively impersonal and uniform system to one that is more personalized and diverse; from one system to multi-systems, from formal to informal, and from a system of limited choice to one with far greater alternatives for students, teachers, and administrators. (5, p. 86)

Let us develop a list which characterizes the potentials which industrial arts could capitalize on in the urban society. The specific opportunities which I can see are characterized in Figure 2.

Figure 2

INDUSTRIAL ARTS—URBAN IMPACT

Curriculum

- broadly-based study of technology
- flexible response to student interest
- elimination of sacredness in content
- elimination of rigidly-applied requirements for manipulative skill development
- greater emphasis on creative exploration
- increased recognition of the value of experimentation
- recommitment to the development of uniquely human relationships based upon common interests, cooperation, and emotional security

Environment

- more flexibly-designed laboratories with emphasis on diversification
- greater emphasis on experimentation—de-emphasis of content prescriptions
- greater use of the mobile classroom and neighborhood involvement
- increased use of community resources, including industrial centers, libraries, museums, and governmental agencies

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The real key to success for industrial arts in the urban setting lies in our ability to recognize the stimuli that the urban child interacts with. Second only to recognition is the necessity of interpreting those stimuli sets in such a way as to help the student make a place for himself emotionally in the world. We will not realize our potential as long as we insist on content prescription as the source of truth and fail therefore to recognize human differences as a basis for educational experiences.

Ultimately, the goal of a democracy, and therefore the educational services provided in that democracy, should be the achievement of an open and free society in which the aspirations of people are held dear. J. Robert Oppenheimer stated:

> The open society, the unrestricted access to knowledge, the unplanned and uninhibited association of men for its furtherance — these are what may make a vast, complex, ever-growing, ever-changing, ever more specialized and expert technological world, nevertheless a world of human community. (6, p. 95)

This is the goal to which all free men must be committed. This is clearly the urgent educational priority of our times. Industrial arts educators must meet this challenge head-on, with dedication to improve the lot of man.

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The Potentials of Industrial Arts in an Urban Setting

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I would like to open this presentation with the statement of a simple premise. The premise is stated to set the stage for the following remarks and not intended as a point of agreement for all persons. The premise as stated is:

INDUSTRIAL ARTS AS IT IS PRESENTLY CONCEIVED
HAS LITTLE TO OFFER IN THE URBAN SCHOOL.

The first reaction to such a statement is to brand the author as a sadist or defeatist for the cause of industrial arts. This natural reaction must, however, be restrained until evidence in support of the premise is presented. Upon completion of the presentation of evidence, some will continue to label the author as a defeatist, while others may find the premise highly supportable.

No matter what conclusion one reaches, the reaching of a conclusion will indicate a stimulation of thought relative to the potentials of industrial arts in an urban setting.

If one is to evaluate the potentials of industrial arts in the urban setting, there appears to be a number of important questions which must be addressed. First, the question of what constitutes an urban setting. Second, what do the schools look like that are located in urban settings? Third, what are the needs of children in the urban setting? Fourth, what is industrial arts? Fifth, why is it that industrial arts has little to offer in the urban school? And lastly, we would be remiss to leave the entire issue without addressing the question of what we can do to make industrial arts a significant contributor to urban education.

Some of the preceding questions are quite simple to answer, while others tend to be more difficult. There may even be a question in the preceding group that none of us can really come to an agreement upon. This question stands out as the shortest, but perhaps the most controversial: "What is industrial arts?"

We will return to this question, but let us first look at the question of "What constitutes an urban setting?" The answer to this question can be derived from a number of approaches. One approach would be to define the urban setting in terms of numbers of people, while a second approach would be to define an urban setting relative to the environmental conditions.

The first and easiest way to define an urban area would be to say that it is a city and, perhaps more explicitly, a large city. Upon investigating the United States' Census Bureau, it is revealed that a city is defined as a community with 2500 or more residents. By today's standards, one can hardly identify a community of 2500 residents as an urban setting. There are figures, however, which can give a better realization of the urbanization of the United States. For example: The Census Bureau predicts that by 1980, 75% of the American people will be living in cities having a population larger than 50,000. This comparison of a city being constituted of 2500 residents and our population concentrating in cities larger than 50,000 reveals the inadequacy of numbers in defining an urban setting.

More realistically, the urban setting can be defined from the viewpoint of the sociologists. In investigating the various sociological theories of urbanization, one author continues to return to the literature with his definition of an urban setting and a city. This author is Louis Wirth, who wrote a classic article in 1938 entitled, "Urbanism as a Way of Life."[1] According to Wirth's theory, an urban setting is composed of three basic concepts — namely, size, density, and heterogeneity.

Size, density, and heterogeneity were not defined specifically, but were delineated in terms of the conditions under which a large, dense, heterogeneous aggregate of people might be expected to cooperate enough to maintain the organization of a city. The conditions were put forth in twelve very specific propositions; however, for the sake of brevity, the propositions can be grouped into four major categories:

1. Residents generally have weak social and traditional bonds. (impersonal)
2. Groups congregate within the urban setting, based upon income and employment hierarchy. (segregated)
3. Physical contact with the city causes residents to lose personal contact with one another. (impersonal)
4. Competition for the limited resources of the city fosters mutual exploitation, rather than cooperation. (exploitation)

Based upon the four major categories, the limitation of the definition of an urban setting to that of strictly a large city would be incorrect. In some suburban settings, the four major propositions are as much in evidence as in a large city. Thus, an urban setting can best be defined as a "relatively large, dense, and permanent settlement of socially heterogeneous individuals,"[2] who, as a group, show manifestations of the four general propositions previously presented.

Although the conditions presented may seem derogatory in nature, some people choose to live in this environment, while others find it impossible to escape this ever-expanding urban setting. According to August Kerber:

> America is an urban nation. More than 61% of the nation's population is concentrated in metropolitan areas, and the percentage of city dwellers is still rising. It created a new culture, a new way of life, and a new kind of man.[3]

The reality of the situation is that the American people have begun to call the urban setting home.

The second question which seems pertinent to be addressed is: What do the schools look like that are located in urban settings?

As educators, we generally accept the contention that the schools reflect the environment in which they are located. Therefore, if the environment is composed of weak traditional and social bonds, group congregation by income and status, concern with physical, rather than human needs, and mutual exploitation, we can thus perhaps best describe the urban school as being in an environment of crisis.

The urban school is faced with the task of providing education for a very diverse population, which comprises a typical urban setting. Heaped upon the task of trying to provide education are a number of problems which seem to plague the school annually. The problems at times seem insurmountable; however, they are not without solution. The annual problems are generally listed as:

1. Lack of sufficient supplies
2. Lack of good teaching personnel
3. Little local support
4. Large class size
5. Insufficient help for children needing special services.[4]

The root of these annual problems stems from a lack of sufficient monies, as well as lack of community support. Money alone will not solve the problems of the urban schools. The people supporting the school, as well as those operating it, must begin to work together to make the school a reality.

Even with the elimination of the monetary and attitudinal problems which plague the school, there remains one problem which is inherent to an urban setting. This problem is having to educate the youth of a very diverse population.

The school brings together the rich and the poor, the well prepared and the poorly prepared, the extremely intelligent and the mentally impaired, the highly mature and the immature, the culturally affluent and the culturally deprived, and one could continue to make comparison until he has exhausted all the traits that describe an urban population. The only thing that can be said for certain is that we are bringing together a group of young human beings whom the school is charged with educating.

The big problem begins to come to light when we attempt to teach all students, using basically the same methodology and the same content. Because of the diverse backgrounds, the content is unfamiliar to some and boring to others; the teaching methods reach some, while they do not reach others. With the compounding of basic problems, the classroom has a tendency to degenerate to a "holding situation" rather than a "learning situation," and this is the all too familiar set of circumstances for the urban school.

The third question, "What are the needs of children in the urban setting?" is a relatively easy question to answer. The needs of children in an urban setting are the same as those of children in a suburban or rural setting. The difference lies in the needs which are met. In the urban setting, many of the children's basic needs fail to be met. For example, the basic human needs of food, clothing, and shelter are often inadequately met. This is not to say that all urban children lack sufficient food, clothing, or shelter; however, the children who do lack these necessities are in the classrooms of the urban school.

Many of the psychological needs of the urban child are also inadequately met. These needs are not necessarily purposely neglected by the parents, but rather, the urban environment is not conducive to meeting these needs. An environment of impersonal, segregated, and exploitatory behavior is hardly conducive to the development of feelings of concern, trust, and cooperation with those in one's neighborhood or community.

The fourth question, and perhaps the question which will bring about the greatest amount of disagreement, is, "What is industrial arts?"

In attempting to answer this question, there seem to be two potential approaches which could help one arrive at a definition of industrial arts. The first approach is a review of all existing definitions, with the prevailing definition being the one cited most frequently in the literature. The second approach is to define industrial arts in terms of what it is not. This approach allows one to eliminate the factors which are not representative of what we conceive industrial arts to be.

Taking the first approach and investigating the literature, one can easily find 35 to 40 different definitions for industrial arts.[5] With the multiplicity of definitions, it seems pertinent that a conclusive definition should consist of the elements common to all existing definitions.

In searching for commonalities, two specific areas reappear in almost all definitions. The first and most frequent term appearing is "Industry," and as one studies the more recent definitions, "Technology." Thus, we would have to conclude that industrial arts must deal with some facet of industry or technology.

The second term that appears is "General Education." In the early definitions, those proposed between 1920 and 1945, the term was used extensively in the attempt to bring the curriculum area of industrial arts into the total educational program. The later definitions, those found between 1948 and 1965, had a tendency to delete the phrase. A good example of this is a comparison of the 1936 and 1965 United States Office of Education's definitions. The 1936 definition stated that industrial arts was:

> A phase of general education that concerns itself with the materials, processes, and products of manufacturing, and with the contribution of those engaged in industry.[6]

In comparison, the 1965 definition of industrial arts by the same organization stated that:

> Industrial arts is the body of subject matter or body of courses, organized for the development of understandings about technical, consumer, occupational, recreational, organizational, social, historical, and cultural aspects of industry and technology.

Since the early 1960's we have seen emerge in the field a group of individuals identified as curriculum innovators. These innovators have come forth with new programs, but their basic definition of industrial arts continues to remain constant. The innovators continue to center on the themes of industry or technology with a return to general education.

This approach was an attempt to define the field in terms of factors which we generally associate with industrial arts. This approach yields a definition of industrial arts that is very broad in context and makes it difficult to perceive an operational program.

Now let us turn our attention to delineating what industrial arts is not. First, and most explicitly, it is not vocational education. Many of the existing programs of vocational or pseudo-vocational education continue to masquerade under the title of industrial arts, thus making it an ever more difficult task to differentiate between industrial arts and vocational education. Secondly, industrial arts is not an academic area. Although many of the curriculum innovators would like to lead one to believe that industrial arts has taken its place in the realm of general education, this is just not true. The fact that one course in industrial arts is required at the junior high level does not make it an integral part of the total educational program. Third, and lastly, industrial arts is not the study of industry. One only need look at the existing programs to realize that we are more correctly studying the arts of industry or, perhaps better stated, the techniques of industry. This is not to say that industrial arts programs are teaching skills, but rather that the programs are attempting to teach industry via its techniques. Through the teaching of the arts or techniques of industry, we have lost sight of the broader goal to teach about the totality of industry.

Having set the stage with a definition of an urban setting, a look at the child and the school in the urban setting, and a definition of industrial arts, it is appropriate that we return to the premise presented at the outset.

INDUSTRIAL ARTS AS IT IS PRESENTLY CONCEIVED HAS LITTLE TO OFFER IN THE URBAN SCHOOL.

The basis which allows one to make this statement is predicated upon the information which has previously been discussed. The contributions of industrial arts can more fully be discussed in terms of the problems of the urban school and the needs of an urban student.

The annual problems of the urban school which were cited earlier as lack of sufficient supplies, lack of good teaching personnel, little local support, large class size, and insufficient help for children needing special services have caused sufficiently grave problems in the strictly academic areas. When contrasting the industrial arts program with the academic programs, the following results emerge. First, the supplies necessary to operate an industrial arts program far exceed the supplies needed in an academic area. Second, with the shortage of industrial arts teachers, the possibility of securing a good teacher greatly diminishes. Third, the safety conditions and general operation of an industrial arts program dictate smaller class sizes than academic programs. Fourth, the concern for the individual who needs special services becomes more acute in an environment similar to the industrial arts classroom, in comparison to the typical academic classroom. The basic lack of sufficient monies makes the industrial arts program a difficult program to support. With a realization of the above inadequacies, it is little wonder that a minimal program of industrial arts continues to exist in the urban school. The nature of the program itself has caused it to be a non-contributor and perhaps a major liability in the urban school.

The needs of the urban child are only more frustrated as he enters the school. The student finds himself with peers from highly diverse cultural, social, and economic backgrounds. He identifies with few and only shows concern for the trust of those who have come from his immediate neighborhood. The entering of the industrial arts classroom only returns him to an environment similar to his community. The lack of supplies promotes competition for the limited resources and promotes exploitation, rather than cooperation. If a program is operational, the practicing of basic skills in the construction of a project meets the needs of only a portion, if any, of the students in the classroom. The industrial arts classroom, similar to the academic classroom, has degenerated to a "holding situation" rather than fostering a "learning situation."

In closing, I would like to address myself to the positive aspects of what can we do to make industrial arts a significant contributor to urban education.

Upon looking at this question in the face of the evidence previously presented, it almost seems imperative to say that the best way to solve the basic problem is to eliminate industrial arts from the urban school. In the face of this evidence, I would contend that this solution would be more harmful than helpful to the urban school. Certainly, industrial arts, as it is presently conceived, cannot continue to exist in the urban school.

There are, however, two major assets which presently exist within the industrial arts program, which could make it a major contributor to urban education. These two assets are our environment for teaching and our willingness to work with non-verbal children. A deeper look at these two assets would give one a better understanding of our potentials in the urban school.

"Environment for teaching" can be placed in operational terms relevant to the laboratory setting and our method of teaching. The laboratory gives the student the freedom to move physically about the classroom and interact with individuals at all levels. The strict physical discipline of remaining in one's seat, as in an academic classroom, is removed in favor of a more natural environment of activity and involvement. The relaxed atmosphere of a laboratory setting is more conducive to learning the same basic information taught in the academic classroom. The teacher remains as the controlling factor within the classroom, while the student works individually or with others in solving problems related to the course content.

The second factor, the teacher's willingness to work with non-verbal children, is displayed almost daily in every school system in the nation. An example can best illustrate this point. A guidance counselor discovers a child who is unable to function adequately in an English classroom; therefore he recommends that the student take industrial arts. The intelligence of the student is not a matter of question, although this is most often inferred. The problem generally centers about the student's inability to verbalize. The industrial arts laboratory, which generates a more relaxed atmosphere, allows the student to begin to verbalize with his peers rather than the authority figure presented by the teacher in a strictly academic classroom. In this new atmosphere, the child is able to function adequately and begins to attack problems similar to those presented in the English classroom. The non-verbal child has not been sought out by the industrial arts teacher; however, the role of industrial arts in the urban school has brought this child into his classroom.

In conclusion, I believe that the future of an effective urban educational system revolves about the incorporation of the methodology of industrial arts and the content of the basic curriculum areas. An understanding of industry will be better imparted to the students when all curriculum areas begin to realize their relationship to the industrial world. Therefore, the definition of industrial arts in its limited context seems to be more detrimental than helpful. The future of an effective urban education lies in the redefinition of the role of industrial arts in the total education process. The following definition is therefore proposed as a beginning of thought on the topic, rather than a conclusion to this presentation.

Industrial arts is a supporting area of the total educational program, involving activities related to all curriculum areas; deriving its content from the various curriculum areas; and taught by a team, involving both the individual classroom teacher and the industrial arts specialist.

FOOTNOTES

(1) Wirth, Louis, "Urbanism as a Way of Life," *American Journal of Sociology*, Vol. 44, 1938, pp. 3-24.

(2) Wirth, Louis, *Cities and Social Life*, University of Chicago Press: Chicago, Illinois, 1964, p. 66.

(3) Kerber, August, and Bommarito, Barbara, *The Schools and the Urban Crisis*, Holt, Rinehart, and Winston: New York, N.Y., 1966, p. 2.

(4) Wayson, William W., "Guidelines for Resolving Some Urgent Problems in Urban Education," *Urban Education*, Vol. VII, No. 2, July 1972, p. 110.

(5) Campbell, Clifford P., and Sears, William N., "A Survey of Definitions of Industrial Education and Industrial Arts," Mimeographed, University of Maryland, 1968.

(6) *Ibid.*, p. 9.

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Educational Reform and Mini-Parks

Robert M. Nogueira

Reform and change and the drive to do something different is possibly more evident in the urban school setting than anywhere else. This may be due to the high visibility of failure that the urban schools typically have in their community and to those outside their community.

The urban areas throughout the nation seem to stand as the most dramatic examples of the failure of our society to provide a successful educational program for all the children of all the people. A program that permits each child to achieve his full potential is popular rhetoric in the educational community. Often programs and districts establish this as their broad statement of intent, their objective.

But many of us realize that this is not always the way that the busy, crowded, and often impersonal urban school is operated. Constraints which run from inflexible schedules and a high absentee rate to minimal funds for supplies and personnel make the attainment of full potential a challenge to the gifted student. The less fortunate disadvantaged student is typically not equal to this challenge, and he often becomes what the literature refers to as a dropout who still comes to school every day.

Many questions come about concerning what we as educators can do to improve the situation. Two areas of interest seem to be of paramount concern: urban student motivation and the priority or interest that the urban student places on his education. Cloward and Jones have shown that "evaluations of the importance of education in the lower and working classes appear to be influenced by occupational aspiration."[1] In their study, they indicated that this is more characteristic of these two groups than of the middle class group.

Although this evidence and other similar evidence concerning career aspiration has been with us for at least a decade, it is quite recent that the concept of career education has alerted educators in general to the real value and potential of career aspiration.

Encouragement for this concept is available from many sources. At the Red Bank Regional High School District in Red Bank, New Jersey, we found this encouragement in the Elementary and Secondary Education Act of 1965 (ESEA, 1965), under the provisions of its Title I language. It provided both encouragement and funding for industrial arts educators to do something different with the disadvantaged child.

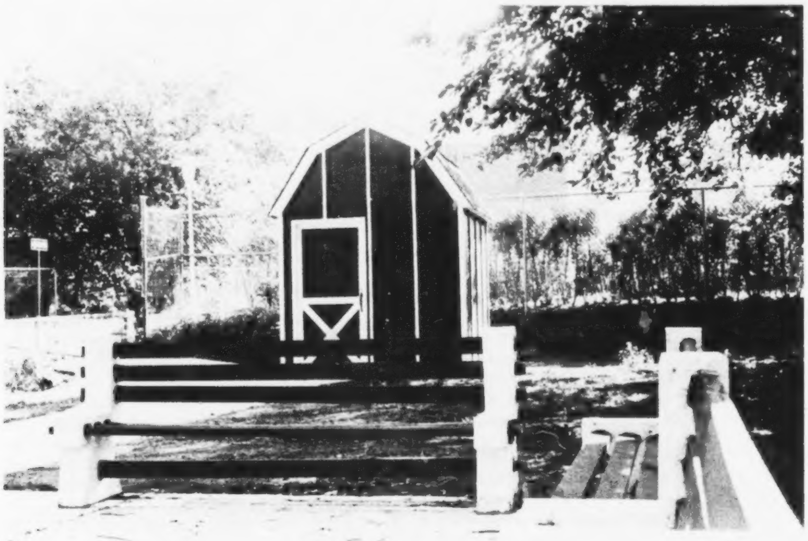
It provided the means to offer real-life rewards to students, while providing them with career information about the world of work and hands-on learning experiences in salable skills.

During the summers of 1971 and 1972, disadvantaged urban students engaged in the design and construction of two "Mini-Parks" in the community. The Mini-Park Projects, as they came to be called, provided a unique experience for the students.

Although referred to simply as the Mini-Park Project, it contained two basic elements: the design and construction of the park and a home economics element, in which high school girls operated a nursery school for the pre-school brothers and sisters of the students in the program. This home economics element also prepared a daily box-lunch for the students at the park "site."

Calling on one of the many community resources, it became possible to have the students employed under the Neighborhood Youth Corps Program of the Monmouth Community Action Program. This provided a real-life reward for the students and encouraged daily attendance and 100% participation.

As part of the program, a remedial teacher was available and worked with students in small groups of two and three on such basic areas as math (fractions, percent, measuring), and reading (basic skills and vocabulary). Based on a standard pretest, students were cycled to the remedial teacher as needed. All the work this teacher did was related to the project. Tasks such as calculating concrete to be ordered, reading blueprints, and specifications were pursued.



Red Bank, N.J., Mini-Park.

The distinctive feature of each Mini-Park is a barn-type storage building. The building was designed by students and was built in modular form in the school shop. It was disassembled, transported to the site, and reassembled on a poured concrete floor fabricated by the students.

Both Mini-Parks included patio areas and sidewalks. This provided an opportunity for experiences in form construction, concrete work, and concrete finishing. Both parks provided benches for the public. One park incorporated the traditional park-type bench, consisting of concrete sides and treated 2 x 4 seats and backs. The other park was designed with reinforced concrete benches which formed a circle around a water fountain.

Each park involved citizen as well as student cooperation. The 1971 project was built next to the Senior Citizen Housing Project in Red Bank, and the local Department of Parks and Recreation provided assistance in the form of sending their trucks and providing shrubbery for the landscaping. The Red Bank Housing Authority provided the site.

On the final day of the project, the senior citizens organized a party for the students. The party was covered by a picture story in the local newspaper, and it has helped the students relate to the community's older citizens.

Students also received recognition from the local Chamber of Commerce. Their park received one of the Chamber's annual awards for property improvement. The Red Bank Department of Parks and Recreation also presented the students an award for community service.

The 1972 project was constructed in the Borough of Shrewsbury, a suburban community of one-family homes. Their Department of Public Works provided the use of their trucks and did preliminary grading at the site with their heavy equipment.

This particular site was adjacent to an existing public recreation field and was an undeveloped borough-owned lot. At the completion of this project, the Shrewsbury Borough Council awarded certificates of appreciation to each of the students who were involved in the project. The awards were made at a public council meeting and were applauded by those in attendance.

You may be asking why all this is thought of as educational reform.

The author and his colleagues feel it represents a significant departure from urban education as it is typically structured and operated. It takes the student out of the school and into the community. It helps the student develop a positive image of himself as a member of his community and a contributing, wage earning member of society.

The program enabled the student to explore, in a hands-on, day-to-day experience, the real world of work. It provided students with skills, attitudes, and employment information that assisted them in making decisions concerning their selection of high school courses and their career aspiration.

The program can serve as food for thought for all of us who are engaged in the design of instructional programs. No longer are we limited to the four walls of the school plant. Most communities are willing and even anxious to cooperate with the schools in learning activities. The growing success of cooperative education programs also bears out this thought.

An immediate outgrowth of these summer programs at Red Bank Regional High School has been a school program this year which involves the design and construction of a full-size storage garage for the Red Bank First Aid Squad. Although this "during the school year" project does not carry an hourly wage for students, it does include academic credit. So, in a very real way, our summer programs have changed our school-year program.

Mini-parks can serve as an easy first step in becoming involved with the extensive use of community resources. Conservation and ecology-based projects also provide a well-documented entry into this area. Precedence and successful program experience are on the side of the educators who are willing to make the proposals to make the changes.

The contemporary literature in our field is full of support for such a departure from routine education. The "organic curriculum" which was proposed by leaders in the U.S. Office of Education a few years back saw the value of using hands-on work of a vocational nature as the principal vehicle for the inculcation of basic learning skills.[2] This may very well have been the forerunner of the present Career Education thrust.

The only caution that this author will offer the interested planner is that an enterprise of this nature is not unlike any other educational enterprise, in that the key element is the staff involved. Red Bank Regional High School was very fortunate to have the services of a team of talented professionals to help make the two Mini-Park programs work.

Roger Schneider and Warren Booth provided the expertise in the construction trades areas; Mrs. Gertrude Foster and Mrs. Elizabeth Tibbetts supervised the child-care portions on alternate summers, and remedial work in the basic skills was provided by Miss Mary Johnson and Mrs. Bonnie Stoia. Without their efforts, the programs would still be paper-work programs and would not be the success that they now are.

FOOTNOTES

(1) Richard A. Cloward, James A. Jones, "Social Class: Educational Attitudes and Participation" in Education in Depressed Areas, A. Harry Passow (Ed.) New York: Bureau of Publications, Teachers College, Columbia University, 1963, pp. 190-216.

(2) U.S. House of Representatives, Committee on Education and Labor, Vocational Education Improvement Act Amendments of 1967, Hearings before the General

Subcommittee on Education on HR 8525, Washington, D.C.: Government Printing Office, 1968.

Mr. Nogueira is presently serving as Administrative Assistant to the Superintendent at Red Bank Regional High School and is a candidate for the Ed.D. at Rutgers University.

BUSINESS OF THE ASSOCIATION

Minutes of the Delegate Assembly Business Meeting

April 4, 1973
Atlantic City, New Jersey

Edward Kabakjian

President Paul DeVore called the meeting to order at 3:30 p.m. Dr. Kenneth Brown was appointed as Parliamentarian for the business meeting. Dr. Franzie Loepp, Chairman of the Credentials Committee, was called upon by the President for the seating of the Assembly.

The President called for the reading of the 1972 Minutes of the Annual Business Meeting. Dr. Edward Kabakjian, Executive Secretary, read the minutes. Tom Tsuji, New Jersey, moved for the acceptance of the minutes, and Miss Laura Lewis, New Jersey, seconded the motion, which carried.

Dr. DeVore called for the reading of the Treasurer's Report. Dr. Kabakjian read the Treasurer's Report. Mr. Raymond Cornell, Illinois, moved for the acceptance of the report, which was seconded by Mr. Harold Bretz, Louisiana. The motion carried.

Dr. DeVore called for old business. He stated that the Delegate Assembly at the Dallas meeting charged the Executive Board to conduct a study on governance. The President reported that the study was underway and being continued. A resolution by the Dallas Assembly also asked that AIAA create a paper on career education. A copy of the approved position statement appeared in each delegate's packet. The Dallas Delegate Assembly passed a resolution urging that an additional professional position be added to the staff in the National Office of AIAA. Mr. Howard McKinley was hired in June 1972 as Coordinator of Professional Services. Dr. Fred Kagy, Past President, AIAA, announced that no constitutional changes were proposed for this year. President DeVore asked Dr. Kagy to bring forward acknowledgement resolutions. Dr. Kagy moved for the acceptance of acknowledgement resolutions A-73-1 through A-73-9. Miss Laura Lewis, New Jersey, seconded the motion, which carried.

Dr. Fred Kagy asked for editorial changes on standing resolution S-73-1, and Tom LeClair moved that the changes be accepted. This was seconded by Lowell Campbell, Texas, which carried. Dr. Kagy presented resolution S-73-6 and moved that the words "this nation" be changed to "all nations." Rex Nelson, Georgia, also suggested that the resolution read "equal opportunity" instead of "the opportunity." This was seconded by William Scarborough, North Carolina. The motion passed.

Dr. Kagy moved for the adoption of standing resolutions S-73-1 to S-73-11. A second was rendered by Harold Bretz, Louisiana. The motion carried.

Because of extenuating circumstances, the list of resolutions was divided into three categories. Dr. Kagy asked that the following resolutions be placed in Group 1, as they required constitutional changes, and requested delay for action until the 1974 Conference in Seattle. The resolutions were as follows, 2,3,4,6,9,10,11,18,23,24,29. He requested that the following numbered resolutions be placed in Group II – those needing alterations in style, format, and some clarification, but no change in intent or specifics. These resolutions will be submitted to each delegate by mail ballot within sixty days. They are: 5,7, 16,17A,19,30. Group III – 1,8,12,13,14,15,17B,20,21,22,25,26,27,28,31 – was considered in proper form and wording for immediate action. William Bain, California, seconded the motion, which carried.

Tom LeClair, New York, moved that President DeVore and Past President Kagy be charged with preparing the Group II resolutions and mailing the ballot to the delegates within sixty days.

Dr. Kagy presented the Group III Resolutions and moved for their adoption. Seconds were rendered by: C-73-1, James Kirkpatrick, Texas; C-73-2, Ray Cornwell, Illinois; C-73-3, Lowell Campbell, Texas; C-73-4, Edward Paloncy; amendment by Rex Nelson, Georgia, seconded by Don Clark, Texas, that commas be placed after elementary and middle, and "higher education in the" added after secondary; C-73-5, William Scarborough, North Carolina; C-73-6, Laura Lewis, New Jersey; C-73-7, Harold Bretz, Louisiana; C-73-8, Tom LeClair, New York; C-73-9, Rayford Harris, Virginia; C-73-10, Armand Taylor, Virginia; C-73-11, Jim Snyder, West Virginia; C-73-12, Roger Betts, Arizona; C-73-14, Alan Goodrich, Missouri; C-73-15, Dale Jones, Ohio.

Editorial changes in several resolutions were suggested from the floor and were found acceptable by the authors. No formal action was requested for the editorial suggestions.

The President, Dr. DeVore, called for new business from the floor. No new business was introduced.

James Littleford, the newly-elected Vice President for College Students, was introduced. Dr. DeVore gave a brief report on the Atlantic City Conference and announced that the 1974 Conference will be held in Seattle, Washington.

The meeting was adjourned at 5:30 p.m.

Implications for Excellence

Donald Maley

> John W. Gardner in his book Excellence — Can We Be Equal And Excellent Too? quotes William James in the statement "The world . . . is only beginning to see the wealth of a nation consists more than in anything else in the number of superior men it harbors." (3, p. 33)

Each of you stands tall in a proud profession, and each of you is a part of that number of superior persons which the industrial arts profession harbors.

The people back home have singled you out as the teacher of the year for your state, and I am confident that each of you deserves this singular honor and all of the tribute that comes with it.

It is this profession's hope that you will become a factor in a great multiplication table that has as its function the multiplying of superior people in education, as well as your special field. Great teams in basketball, football, baseball, government, space, or industry are not the result of an isolated and insulated individual team member's performance that tends to ignore his or her role in working with and developing others.

In essence, you are being asked to become involved in the process of up-grading the performance of all with whom you teach. The profession cannot afford to have you sit complacently in faculty or professional meetings and let the leadership and the decision-making be taken over by incompetence, lethargy, laziness, and rigidity. The goal in education is not what you do for yourself. It is much more a matter of what you do for others. But do not construe this to mean just working with your assigned students. The effectiveness of the previously-mentioned multiplication table is dependent upon your reaching other teachers and teachers of teachers in ways that their performance will be greatly improved. The name of the game is individual and shared involvement. John Gardner put it this way —

> . . . We must restore both a vigorous sense of individuality and a sense of shared purposes. Either without the other leads to consequences abhorrent to us. (3, p.137)

There is a fine old song that contains the words, "the eyes of Texas are upon you," but for each of you that is just the beginning, and for some of you Texas might be thousands of miles away. This recognition by your peers and your superiors means that these people in each of your states have had their eyes upon you, and they liked what they saw you do as teachers of boys and girls in your laboratories. The fact that you have been singled out from all of the others brings with it the penalty of critical and lofty expectations from all who know or learn of this tribute that you receive here today.

As I make this statement, I am reminded of an inquiry that was made regarding my own noble ancestry. One Englishman raised the question of another as to — "Why is it that so many admirals in the British Navy come from Scotland?" The other Englishman without a hesitation replied — "Anyone who could endure the cold and ruggedness of Scotland for the period of his first eighteen or twenty years was fully capable of becoming anything he wanted to become."

And I would suspect that each of you has taken up a similar challenge for your own personal achievement. That is to say that one can see some close analogy in this story for your own success. On the one hand, there is the aspiring admirals of the British Navy as they endure their early years in the ruggedness of Scotland, and on the other hand there are those of you in industrial arts who achieve distinction surrounded by the foreign and at times hostile environment of a "monastic" system of education.

Permit me to elaborate on this point by selecting a series of statements from a recent article by Peter Drucker as he described the educational system in which you must grow and function with excellence.

> Today's school is still the school of the scribes. We are beset by verbal arrogance, contemptuous of whatever is not reading, writing, or arithmetic. And yet one look should show us a world in which verbal skills are not the only productive ones. They are necessary—a foundation. But the purely verbal skills are not necessarily the central performance skill when electronic media carry the main information load. (2, p.86)

Earlier in the same article, Drucker made the following comment:

> The schools see themselves as they once were: a fleeting, not very important experience for the great majority, a vocational preparation for the learned professions for a small minority. The curriculum focuses on a small, narrow sector—the purely verbal. Educators look today for the very same things monks looked for 800 years ago when they trained scribes for the monastery or for the King's service. (2, p.5)

Perhaps you may consider the previous statement a bit sharp, yet a close examination of the operation of your schools might cause one to take a second thought.

Alfred North Whitehead discussed this same issue in his text, The Aims of Education, as follows:

> ...First-hand knowledge is the ultimate basis of intellectual life. To a large extent, book-learning conveys second-handed information, and as such can never rise to the importance of immediate practice. . . . What the learned world tends to offer is one second-hand scrap of information illustrating ideas derived from another second-hand scrap of information. The second-handedness of the learned world is the secret of its mediocrity. . . . (4, p.61)

Your world is that of the first-hand experience, and as such it exists for the most part in an educational system whose theory and practice are at odds with yours. As Peter Drucker put it— "We are beset by verbal arrogance, contemptuous of whatever is not reading, writing, or arithmetic."

Yes, there is some obvious analogy between your success in your laboratories and the success of the young men from Scotland who achieve greatness on the sea.

However, amid the bleakness and barrenness of the total educational environment in which you work, just like those sturdy Scotch lads, you too have many strong assets. These assets are in your dedication to broad purposes of education, to the total development of man, to a concept of individual fulfillment, and certainly a great deal of your assets lie in the fundamental concepts of learning and human development that reside in your area of teaching. Permit me to focus in on this last point for just a minute or two.

Nearly every respected theory of learning is on your side in your struggle for existence and importance in the total system of education that for the most part bases its practices on a 17th Century model.

The theories that relate to the concept of multiple sensory perception are clearly in your corner, as the learners in your laboratories have an abundance of opportunity to use the senses of seeing, hearing, smelling, tasting, and touching as the means by which a more complete perception is attained.

The theories that relate to the concept of "feedback" in the learning process are integrally related to countless activities typically found in the industrial arts program.

The concept of reinforcement as a fundamental idea in the learning process has few more lucrative arenas to operate in than the industrial arts laboratory with its potential for many and diverse activities.

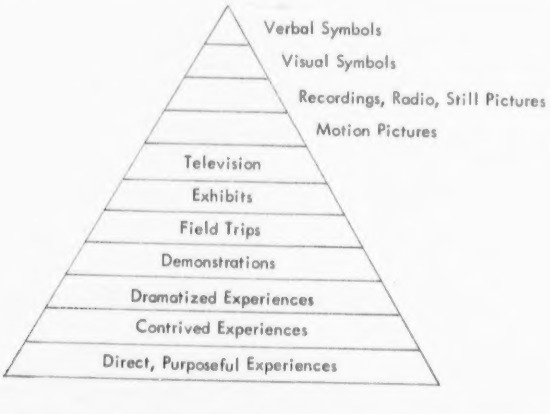
The concepts of learning that relate to goal identification, goal attainment, short- and long-range goal projection, achievement, and assessment are natural components of a well-thought-out industrial arts program.

The numerous theories of learning that relate to motivation and increased student activity in the educational experience have endless potential for demonstration, testing, and implementation in industrial arts.

The educational theories that relate to the broad concept of human involvement as an imperative in the learning processes are fully capable of implementation in the good industrial arts program, and to a degree and range of diversity that few other areas of the school can begin to approach.

Take, if you will, the ideas presented in Edgar Dale's "cone of experience" as a categorization of the levels of concreteness embodied in various forms of educational procedures. (1, p.43)

The broad base of the "cone" represents educational procedures that involve "direct, purposeful experiences." The width of this base part of the cone symbolizes the degree of concreteness of such experiences. Each succeeding layer of the cone gets narrower and narrower, as well as less and less concrete, as the procedures move from the direct, purposeful experience, to the contrived experiences, dramatized experiences, demonstrations, field trips, exhibits, television, motion pictures, recordings – radio – still pictures, visual symbols, and finally, at the top of the cone at its narrowest sector, there are the verbal symbols. The narrowness of this sector representing the verbal symbols is symbolic of the lack of concreteness in the verbal procedures. Yet one might ask – "Which of these do we use the most in our schools, and which is it that the school for the most part uses as the principal means for success in its programs?" (See figure 1.)



Here again, the greatest degree of concreteness is centered in those educational procedures typically found in the industrial arts program: i.e., the direct purposeful experiences.

Another very important idea that relates to this point is the whole matter of direct first-hand experience as opposed to the verbal second-handed experience, as discussed in the previous section of this presentation. The experiential nature of industrial arts activities as they relate to the study of industry and technology provides for systems of learning, motivation, feed-back, involvement, sensory participation, reinforcement, as well as goal projection and attainment that greatly enhance the importance and role of industrial arts as a viable and indispensable component of education in the 21st Century.

It seems to me that with all of these concepts, theories, and principles so integrally tied into the industrial arts activity, the real challenge should not be one of existence. It should be the challenge to each of us to demonstrate our potential in these areas, and equally important, we must communicate to all concerned with education that we are in fact the model demonstration center for education in each of our schools.

You are well on the way to that ideal, but there remains much to be done. It is my hope that each of you will cherish the trophy or plaque you receive and that you will put it up in a prominent place in your laboratory – not as a symbol of self-aggrandizement, but as a constant reminder that you have been recognized as the best and that each day's performance must truly represent the best.

> ...Very few have excellence thrust upon them. They achieve it. They do not achieve it unwittingly, by "doing what comes naturally"; and they don't stumble into it in the course of amusing themselves. All excellence involves discipline and tenacity of purpose. (3, p.92)

But there is another very important challenge that extends beyond you as an individual. The public, the PTA, the board of education, and the many components of your communities will learn of your identification as the best, and they will be proud to have you as one of their own. But, they will also take a close look at what the best teachers (you here today) in the profession have to offer as a program. Industrial arts in the eyes of the communities from which you come will be that which they see in your laboratory, since the profession has singled you out as the best they have to offer.

John Gardner in quoting Mason Brown put it this way —

> "Excellence is a strange bargain. Life owes us little; we owe it everything. The only true happiness comes from squandering ourselves for a purpose." (3, p.149)

And to you, my friends, I say that your excellence is a strange bargain that you have made with society. Teaching owes each of us little; but for we who toil in it, we owe it everything. The only true happiness for the great teacher comes from squandering him or herself for the great and noble purposes of teaching with excellence.

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Teacher Recognition Program

On Thursday, April 5, fifty-one Outstanding Industrial Arts Teachers of the Year 1973 were honored by the Teacher Recognition Committee during the International Conference of the American Industrial Arts Association at Atlantic City, New Jersey.

Forty-eight teachers were from the United States, one represented Puerto Rico, and two were from provinces of Canada.

Industrial Arts Teachers of the Year, 1973: Booker T. Taylor, Alabama; Leon F. Vines, Alaska; M. Roger Betts, Arizona; Ralph W. Shilling, Arkansas; Tom T. Dardarian, California; Gerald E. (Jerry) Buck, Colorado; David M. Mordavsky, Connecticut; Paul L. Thompson, Delaware; Hollice H. Plotts, Florida; Harold E. Quinn, Georgia; George E. Schumann, Jr., Hawaii; Larry Dean Staack, Idaho; William L. Clanton, Illinois; Frank Moriconi, Indiana; Herald J. Kliewer, Iowa; William G. Ward, Kansas; William M. Roach, Kentucky; John M. Speyrer, Louisiana; W. Harley Smith, Maryland; Guy A. Tardanico, Massachusetts; Harold C. Hill, Michigan; Allen S. Cuthbert, Minnesota; Robert H. Palmer, Mississippi; Pete Mercurio, Missouri; Robert S. Taylor, Montana; Harold T. Kubick, Nebraska; Wendell H. Boley, Nevada; Laura L. Lewis, New Jersey; Raymond E. Morrison, Jr., New Mexico; John C. Duggan, New York; Foster L. Hayes, North Carolina; Bertrand S. Egstad, North Dakota; Dale V. Jones, Ohio; Wendell E. Miles, Oklahoma; Larry E. Cathcart, Oregon; Curtis W. Gable, Pennsylvania; Nicholas Spolidoro, Jr., Rhode Island; Cleveland A. (Corkey) Huey, South Carolina; Cornelius Teunissen, South Dakota; James N. Stewart, Tennessee; Ralph W. Schultz, Texas; Dean E. Christensen, Utah; Allen A. Chandler, Vermont; Earl Rodney Fulton, Virginia; Dury A. Fox, Washington; Vincent E. Lazear, West Virginia; Marvin L. Schutts, Wisconsin; Joe D. Svoboda, Wyoming; Juan Quirindongo, Puerto Rico; Calvin R. Foster, Ontario, Canada; and Ernest E. C. Chan, Saskatchewan, Canada.

Recipients of 1973 Teacher of the Year Award

William J. Wilkinson

Association officers in the states, territories, and provinces of Canada must be complimented for directing the program in their local areas. Dr. Edward Kabakjian and his office staff forwarded many forms to us, which were inadvertently sent to the national office. We want to thank them for their efforts.

Members of the AIAA Teacher Recognition Committee should be commended for carrying out their assignments. William B. Landon, Vice President for Classroom Teachers and Chairman of the Teacher Recognition Committee, carried on most of the correspondence with the state associations. Russell Amling printed the forms on which the information for outstanding teachers was recorded. J. A. Rodgers Swan directed the program for Canada, as did Manuel Hernandez for Puerto Rico and the Virgin Islands. William J. Wilkinson was responsible for the engraved bronze plaques. David M. Mordavsky had the press release typed and sent to various newspapers. T. L. Bay, Jr., was responsible for the production of the programs. Dr. Dan Lopez printed the Certificates of Honor, and Thomas J. Barber printed the ribbons for the outstanding teachers. These were evident on the jackets of the recipients during the conference.

Many, many thanks to everyone who contributed to the success of the Teacher Recognition Program. We certainly want to thank Dr. Donald Maley, who gave a very impressive address to the Teachers of the Year and guests during the ceremony.

Resolutions of the Delegate Assembly

The resolutions presented to the Delegate Assembly in Atlantic City for consideration were divided into three groups: those resolutions which follow were accepted by the Assembly; a second group has since been revised because of faulty wording and has been sent to the delegates for a vote by mail; the remaining group was considered and accepted by a committee for constitutional review.

CURRENT RESOLUTIONS

C-73-1. Whereas the quality of industrial arts programs within a state is, to a great extent, determined by the quantitative and qualitative level of supervision available from the state department of education and/or from the local school districts, now therefore be it

RESOLVED that the American Industrial Arts Association assist the state supervisors of industrial arts in searching for and securing funds — regardless of source — to support supervisory activities at the state and local level, and be it further

RESOLVED that the American Industrial Arts Association Executive Board appoint a representative committee to draft a statement of minimal qualifications and responsibilities for state and local supervisors.

C-73-2. WHEREAS the educational needs of man are changing, and

WHEREAS our culture is changing from an industrial to a technological base, and

WHEREAS our profession finds itself concerned with an ever-increasing number of diverse programs, and

WHEREAS our current name does not reflect these changes nor the international scope of the organization, now therefore be it

RESOLVED that the Executive Board of the American Industrial Arts Association appoint an ad hoc committee for studying the feasibility of adopting a new name for the association and make recommendations for action at the 1974 meeting of the delegate assembly.

C-73-3. WHEREAS technology is a pervasive force within our society affecting all individuals and groups therein, and

WHEREAS industrial arts education has historically attempted to provide relevant education relating to the changes in the forms of materials to increase their value to such and of the problems of life related to these changes, and

WHEREAS school administrators, teachers of other disciplines, parents and the general populace, including students, have been and continue to be confused about the role of industrial arts in developing technological literacy (Man/Society/Technology relationships), therefore, be it

RESOLVED that the Executive Board of the American Industrial Arts Association take action to conduct, on a nationwide basis, regional and state forums designed to educate school administrators and other segments of our society about the role of industrial arts in developing technological literacy.

C-73-4. WHEREAS the Supreme Court of the United States has suggested that new methods of funding education be explored, and

WHEREAS state legislatures are charged with the responsibility of providing free public education for the citizens of their domains, and

WHEREAS industrial arts is concerned with interpreting the technology to students in the American public schools, be it therefore

RESOLVED that the membership of the American Industrial Arts Association direct the Executive Board to appoint an ad hoc committee to draft model legislation for submission to the various state legislatures entitled The Technology Education Act, and that this act shall charge industrial arts with the responsibility for increasing the technological literacy of the students in the public schools, and that adequate funds be made available to support industrial arts programs in the elementary, middle, secondary, and higher schools of the state, and be it further

RESOLVED that the model proposal shall be submitted for ratification not later than the thirty-sixth annual meeting.

C-73-5. WHEREAS the Supreme Court of the United States has suggested that new methods of funding education be explored, and

WHEREAS legislation passed by the Congress of the United States identifies, encourages and supports specific curricula in the American public schools, and

WHEREAS industrial arts is concerned with interpreting the technology to students in this educational enterprise, and

WHEREAS quality programs of industrial arts have special needs which require a higher level of funding than other general education programs, be it therefore

RESOLVED that the membership of the American Industrial Arts Association direct the Executive Board to appoint an ad hoc committee to draft a model legislation proposal entitled A Technology Education Act for the American Public School to be submitted to the Congress of the United States, and that the proposal identify the problems and suggest remediation for those problems faced by those elements of the curriculum which are concerned with technology in the public schools, and be it further

RESOLVED that the model proposal shall be submitted for ratification not later than the thirty-sixth annual meeting.

C-73-6. WHEREAS the role of women in society is changing as a result of numerous sociological and technological developments from a limited home and family orientation to a broader social and professional orientation permitting more women to enter or reenter the labor market each year and to exercise an increasing variety of career options, and

WHEREAS this changing role of women in society continues to be reflected in increasing numbers of girls enrolled in industrial arts programs at all educational levels for assistance and preparation for responsible decision-making concerning industrial and technical pursuits, be it therefore

RESOLVED that the AIAA recognize women students and teachers as equal participants with men in all phases of industrial arts education and encourage women to prepare to serve the field of industrial arts as teachers, supervisors, and teacher educators.

C-73-7. WHEREAS revenue sharing proposed by the President of the United States will replace most categorical funding and could be detrimental to special programs such as industrial arts, therefore, be it

RESOLVED that the AIAA Executive Board appoint an Ad Hoc committee to study and analyze the implications of revenue sharing with respect to industrial arts education, and be it further

RESOLVED that the Committee develop guidelines to assist state and local educational agencies in negotiating for funds earmarked for revenue sharing.

C-73-8. WHEREAS recent federal legislation and, in many instances, state legislation, has redefined vocational education to include industrial arts for funding purposes, and

WHEREAS many industrial arts teachers, teacher educators, and supervisors feel constrained to support both the American Industrial Arts Association and the American Vocational Association, and

WHEREAS some commercial concerns are apparently finding it difficult to exhibit at two similar major conferences annually, and

WHEREAS the American Industrial Arts Association purports to be the only national organization which speaks solely for the industrial arts profession, and

WHEREAS many other factors such as the emergence of the career education concept must be considered by national education associations, therefore be it

RESOLVED that the Executive Board of the American Industrial Arts Association immediately undertake a study to determine what future relationships should exist between AIAA and AVA, with representatives from both associations entering into dialogue as part of the study, and be it further

RESOLVED that a preliminary report to the membership of AIAA be made through an association publication at least one month prior to the 1974 International Conference of the AIAA.

C-73-9. WHEREAS the United States of America will observe in 1976 its 200th birthday, and

WHEREAS the birth of educational programs which ultimately became known as "industrial arts" can be traced to the Philadelphia Exposition of 1876, and

WHEREAS the growth and dynamism and world leadership of the USA has been due in large measure to industry, technology, and individual craftsmanship, therefore be it

RESOLVED that the AIAA begin making plans immediately for nationwide observance of these two related events and that the resources of the association, the state associations, and the membership be committed to producing a highly appropriate, highly visible program of commemoration.

C-73-10. WHEREAS the facilities and equipment of many industrial arts teacher education departments are antiquated and out of date, and

WHEREAS there is increasing evidence to indicate that some teacher education programs will be forced to close due to on-campus financial competition, and

WHEREAS the production of an adequate number of well-qualified teachers continues to be a problem, therefore be it

RESOLVED that the Executive Board of the AIAA consider the feasibility and method of communicating with colleges of education, universities, Boards of Regents, and state departments of education to bring attention to inadequate funding and offer to provide consultants as needed to improve or initiate teacher education programs.

C-73-11. WHEREAS membership in the AIAA has been declining even though there is a steady increase in the number of industrial arts personnel, and

WHEREAS it is assumed that part of the reason for the decline can be traced to the loss of liability insurance coverage, therefore be it

RESOLVED that the Executive Board of AIAA undertake immediate and vigorous action to restore, if at all possible, the liability insurance benefit, and be it further

RESOLVED that the membership be informed at the earliest possible date of the reasons why the liability insurance benefit was discontinued and of what measures are being taken to restore the insurance benefit.

C-73-12. WHEREAS the Executive Board of the AIAA has felt the need to examine the roles of state industrial arts associations which are affiliated with AIAA, and

WHEREAS apparently no documents exist which delineate the responsibilities and benefits to accrue to both the state industrial arts associations and the AIAA as a result of affiliation, therefore, be it

RESOLVED that the Executive Board of the AIAA define, publish, and distribute within six months a document which clearly defines the roles, responsibilities, and benefits to result from affiliation, and be it further

RESOLVED that steps be taken to ensure that both the AIAA and affiliated state industrial arts associations live up to the terms of the affiliation agreement.

C-73-13. WHEREAS the needs and interests of students and society are undergoing rapid change, and

WHEREAS the explosion of technological knowledge and its impact upon our society is developing at an accelerating rate, and

WHEREAS new and more effective patterns in curriculum and instruction are constantly being discovered, and

WHEREAS new educational delivery systems are being designed continuously, and

WHEREAS more valid, reliable, and educationally supportive evaluation systems are being developed, be it therefore

RESOLVED that the American Industrial Arts Association strengthen and unify industrial arts programs by initiating and promoting plans, procedures, and programs of inservice education on a continuing basis throughout the nation as a means of aiding each teacher in contributing to high-quality education in industrial arts and education.

C-73-14. WHEREAS the Association has no formal procedure for the assessment of the Association's missions and goals, and

WHEREAS the Association operates on a reaction basis rather than a planned basis, be it

RESOLVED that the representative national assembly direct the Executive Board to establish planning councils at the national and regional levels for the purposes of: (1) studying the issues relevant to the association, (2) ascertaining the missions and goals of the association, and (3) preparing position papers for action by the association through the Representative National Assembly and the Executive Board.

C-73-15. WHEREAS the American Industrial Arts Association believes the role of the teacher is a basic factor in quality education, and

WHEREAS each teacher education institution must provide preparation of the highest quality, and

WHEREAS many programs of teacher education lack basic support in physical facilities and staffing; therefore be it

RESOLVED that the American Industrial Arts Association, through its Executive Board, establish a set of standards for facilities, staff qualifications, and minimum basic programs for industrial arts teacher education, and be it further

RESOLVED that the Executive Board report to the Representative National Assembly at the 36th Annual Conference in Seattle, Washington, on progress toward meeting the intent of said resolution.

C-73-16. WHEREAS there is much confusion on the part of school administrators, teachers, and the general public about contemporary industrial arts and technology programs, and

WHEREAS there are a number of curricular options and alternatives accepted by the profession; therefore be it

RESOLVED that the Executive Board of the American Industrial Arts Association initiate action to publish a curriculum guide for school administrators, teachers, and the general public which provides information on a number of curricular options and alternatives most accepted by the profession, and be it further

RESOLVED that said publication include proposed offerings, resources, schedules, and facilities required.

C-73-17. WHEREAS 1976 is the 200th birthday of our Republic, and

WHEREAS the success of our country in providing one of the highest standards of living for the most people ever is a democracy whose fundamental economy is based on industry and technology, and

WHEREAS the mission of industrial arts education in this country has been to teach youth about the industrial and technological elements of our culture; therefore, be it

RESOLVED that the Executive Board initiate action to conduct and support during 1975-76 a Man/Society/Technology Forum Series with the goal of developing at local, state, and national levels projections and plans for the American Industrial Arts Association for the next century, and be it further

RESOLVED that, during 1975-76, one issue of the Man/Society/Technology Journal be devoted to the theme, "Industrial Arts — The Past 200 Years — and the Future," and be it further

RESOLVED that the Executive Board initiate a proposal to the ACIATE that the theme of the 25th Yearbook (1976) be "Industry and Industrial Arts: the Year 2000," and be it further

RESOLVED that the Executive Board allocate major program space for presentations of reports of work and studies of the Forum Series at the 1976 AIAA Conference.

C-73-18. WHEREAS the American Industrial Arts Association, through its members, has over the years provided leadership for the entire educational profession, and

WHEREAS highly educated industrial arts teachers are knowledgeable in the many areas required to function effectively in an age of unprecedented technological and social change, and

WHEREAS the industrial arts profession is being asked to expand its role and mission of educational leadership in the technologies, and

WHEREAS the current structure of the American Industrial Arts Association does not reflect the technological society it represents, and

WHEREAS the membership of the association finds itself concerned about a number of areas of education, all in some manner or other related to the central theme of industry, technology, and education; therefore, be it

RESOLVED that the Executive Board of the American Industrial Arts Association initiate action to develop a plan which will provide an organizational scheme at the state and national levels which will include sections devoted to special interest areas most representative of our technological society.

C-73-19. WHEREAS the Congress of the United States has initiated action to establish an Office of Technology Assessment, and

WHEREAS the American Industrial Arts Association recognizes the need for the study and assessment of new technologies, and

WHEREAS the American Industrial Arts Association supports the inclusion of technology as an area of knowledge for study in education, therefore be it

RESOLVED that the American Industrial Arts Association, through its Executive Board, take steps to support the establishment of the Office of Technology Assessment, and be it further

RESOLVED that the Executive Board of the American Industrial Arts Association inform the Chairman of the Committee for the Establishment of the Office of Technology Assessment to include requests for funding for the establishment of technology as a major discipline area in education at all levels of education.

C-73-20. WHEREAS programs of industrial arts education meet specific educational needs at all levels of education, and

WHEREAS there is a need for programs of study concerned with industry, technology, and our changing society, and

WHEREAS opportunity for study in industrial arts is limited at colleges and universities, therefore be it

RESOLVED that industrial arts instruction be included as a definite and integral part of undergraduate programs throughout the nation, and be it further

RESOLVED that a definite program be established from kindergarten through college employing a specific curriculum for each learning level, and be it further

RESOLVED that the membership of the American Industrial Arts Association take action to design such a program to meet the present and future needs of society.

STANDING RESOLUTIONS

S-73-1. The AIAA believes that excellence in the classroom is the foundation of a good education system. The Association therefore supports the philosophy that only properly certificated individuals be permitted to teach industrial arts. The Association seeks the establishment of minimum standards for issuance of teaching certificates for the teaching of industrial arts with no less than a baccalaureate degree with a major area of study in industrial arts education.

S-73-2. The AIAA believes that an industrial arts program offers one of the best educational opportunities that can be used to help young people grow to the maximum of their individual abilities; therefore, the Association further believes that a program of industrial arts should be offered in all elementary, middle, and secondary schools in the nation.

S-73-3. The AIAA believes that program and institution accreditation assures the continued development of quality programs of instruction. To this end, the AIAA encourages its committees and member councils to formulate accreditation and/or update standards for all programs of industrial arts conducted in elementary, middle and secondary schools, colleges, and universities. The standards should be designed to promote improvement through self-evaluation as well as provide criteria used by accreditation agencies.

S-73-4. The AIAA believes its effectiveness would be greatly enhanced if its total membership more closely approached the Association's potential, and therefore encourages its members to make a personal commitment to put forth a sustained effort to increase membership.

S-73-5. The AIAA believes that a maximum effort should be extended in soliciting membership for and continuing the development of the industrial arts student clubs at both the high school and college levels.

S-73-6. The AIAA believes that all persons regardless of race, creed, color, or sex be given equal opportunity to participate in the programs of industrial arts in the schools of all nations.

S-73-7. The AIAA believes and continues to support the international movement to standardize and convert to the metric measurement system and encourages all of its members to include instruction on the metric system in their classes.

S-73-8. The AIAA believes that all educators and all professional associations should work together in the education of the youth of our schools to better prepare themselves for our ever-changing technological society.

S-73-9. The AIAA believes that the industrial arts teacher education programs in our colleges and universities is our essential element in supplying professional personnel for quality programs of industrial arts in the nation's schools.

S-73-10. The AIAA believes that a maximum effort should be extended in the business-industry-education partnership for the purposes of keeping that segment of the society informed of the contribution of industrial arts to the youth of our nation.

S-73-11. The AIAA believes and supports the efforts of our international committee in strengthening the industrial arts associations and programs in all nations of the world.

ACKNOWLEDGEMENT RESOLUTIONS

A-73-1. Appreciation to the President. Whereas Paul DeVore, as president of the American Industrial Arts Association, has given so liberally of his time and his talents, exhibiting an outstanding capacity for leadership, and

WHEREAS, the Association has made exemplary progress under his leadership,

BE IT HEREIN RECORDED that the Association, through its membership, officers, and executive board, express its fullest appreciation to him.

A-73-2. Appreciation to the Convention Committee, the Program Committee, and the Program and Convention Participants. Inasmuch as the Thirty-fifth Annual Conference was possible through the direct dependable and efficient service of great numbers of members of the Association, and inasmuch as the conference has achieved a resultant outstanding level of success,

BE IT HEREIN RECORDED that sincerest appreciations are expressed to Clarence L. Heyel, General Chairman, and Donald Maley, Program Chairman, to the members of convention committees, and to all the teachers, supervisors, teacher educators, and students whose efforts in total produced this conference.

A-73-3. Appreciation to the Ship. Inasmuch as the continuing support for and participation in the conduct of the annual conference of the Association, and in view of the excellence of this year's commercial exhibits as a dominant feature of the conference,

BE IT HEREIN RECORDED that the American Industrial Arts Association expresses its appreciation to Educational Exhibitors for their participation in the 1973 conference.

A-73-4. Appreciation to the Teacher Recognition Program. Inasmuch as the Association is dedicated to encouraging excellence in teaching, and inasmuch as its program of recognition of outstanding teachers is marked with increasing excellence,

BE IT HEREIN RECORDED that expressions of appreciation are tendered to William B. Landon, Vice-president for Classroom Teachers, and his committee for their contribution in the conduct and promotion of this program, and

BE IT ALSO RECORDED that appreciation is expressed to the officers and members of state associations who have participated in this program.

A-73-5. Appreciation to the Vice Presidents. Whereas Earl R. Zimmerman, Vice-President of the American Council of State Supervisors, has given so liberally of his time in the leadership as President of his Council for the past two years and has devoted and exhibited outstanding leadership services as Vice-President of the American Industrial Arts Association, and

WHEREAS F. Jack Young, Vice President for Canadian and International Members, has given so liberally of his time in the leadership of our international program over the past five years and has devoted and exhibited outstanding leadership services as Vice-President of the American Industrial Arts Association, and

WHEREAS William B. Landon, Vice President for Classroom Teachers for the American Industrial Arts Association, has exhibited steadfast devotion and effective and solid leadership to the American Industrial Arts Association, and

WHEREAS the Association has made exemplary progress under their leadership roles as Vice Presidents,

BE IT HEREIN RECORDED that the Association, through its membership, officers, and executive board, express its fullest appreciation to them.

A-73-6. Appreciation to the Governors of Delaware, Maryland, New Jersey, New York, Pennsylvania, and Virginia. In view of their support for industrial arts in their respective states, and for the 1973 Conference of the association in Atlantic City,

BE IT HEREIN RECORDED that the Association expresses its appreciation to Governors Sherman W. Tribbett of Delaware, Marvin Mandel of Maryland, William T. Cahill of New Jersey, Nelson A. Rockefeller of New York, Milton J. Shapp of Pennsylvania and Linwood Holton of Virginia for their assistance in making this conference a success.

A-73-7. Appreciation to the State Departments of Education of Delaware, Maryland, New Jersey, New York, Pennsylvania, and Virginia.

Because the progress of industrial arts education within each state reflects the philosophy and efforts of the State Department of Education, the Association expresses its appreciation to those departments for their cooperation toward this conference and for their achievements for the improvement of industrial arts education in those states.

A-73-8. Appreciation to the Public Schools of Atlantic City. Inasmuch as the success of the 1973 convention was insured by the fullest cooperation of Jack Eisenstein, Superintendent of Atlantic City Schools, and his staff,

BE IT HEREIN RECORDED that the officers and members of the Association express their gratitude for their assistance.

A-73-9. Appreciation to the National Office. Because of the vital role of the National Office in the effectiveness of the service of the Association, the Executive Board and membership expresses appreciation to the Executive Secretary-Treasurer, the Coordinator of Professional Services, and to the National Office staff.

The President's Report, 1972-73

Paul W. DeVore

This past year as president has been, for me, a year of new insights into the profession and our association. It has been also a year of frustration, frustration in not being able to do all that needs to be done. Most of all, though, it has been a year which has given me an opportunity to look to the future. This report, therefore, will be limited to a brief review of the business of the Association this past year. The major portion of my report shall deal with the Association and its future.

HIGHLIGHTS OF 1972-73

The general business of the Association in providing services to its members continued with activities related to the publication of the Monitor and MAN/SOCIETY/TECHNOLOGY; representing the Association in the U.S. Congress, at the U.S.O.E., and at national meetings; preparation of proposals for liability insurance programs; development and distribution of films and other media; servicing our youth organizations; and providing coordination for activities such as our international conference, among other things.

There were three significant actions by your Executive Board this past year. They were:

A. Creation of a new position in the national office entitled Coordinator of Professional Services. The prime responsibilities of this position are:

1. Coordination of student club activities, high school and college;
2. Coordination of the International Conference and other activities related to business and industrial liaison.

B. Position Paper on Career Education

The Representative Assembly in Dallas directed the Executive Board to initiate action for the preparation of a position paper on Career Education. This has been done and, by official action of your Executive Board in January 1973, a statement was adopted. The statement, as adopted, is being distributed by the national office. Copies are available in each delegate packet.

C. Vice President for College Students

Based on recommendations contained in a detailed study entitled "IACC—Study and Recommendations," conducted by the officers of the AIACSA, the IACC Committee Chairman, the President of the ACIATE, and the Coordinator of Professional Services, the Executive Board, by action in January 1973, "moved that effective immediately, a position of Vice President for College Students be created as a position on the AIAA Executive Board."

The position will be filled by the elected president of the American Industrial Arts College Student Association, who shall serve on the AIAA Board for the term of his AIACSA office.

It is my opinion that the creation of the position of Coordinator for Professional Services with major responsibility for student clubs, plus the creation of a Vice President for College Clubs position on the Executive Board, will have significant and positive benefit to the goals and objectives of our Association.

The Executive Board, after several meetings and much discussion, voted to continue the International Relations Committee and to adopt the recommendation of the Committee on the creation of an ad hoc Committee on Internationals for the purpose of exploring the formal relationship of an international consortium of associations involved in technology and human resource development.

In addition, the Executive Board approved the appointment of an ad hoc Committee on Governance of the Association with the responsibility to recommend changes in the governance of the Association for the purpose of improving involvement by classroom teachers.

Included in a number of routine actions were activities associated with:

1. Publication of an updated constitution.
2. Conducting a study of the affiliation status of State Associations. According to present records, there are 37 affiliated State Associations.
3. Initiating action to strengthen State Associations.
4. Continuation of research by the research committee on association membership.
5. Providing support for the Committee on Environmental Education, including approval for a monograph on Ecology and Industrial Arts and planning for a National Forum on Ecology and Education.
6. Directing the History and Archives Committee to prepare a representative contract between the AIAA and a college or university for purposes of discussing a permanent location of the History and Archive material of the AIAA.
7. Establishment of an Awards and Recognition Committee for the purpose of honoring individuals within the Association who have made significant contributions to the field of industrial arts education.
8. Authorization of a study on the geographical location of our National Office.
9. Completion of the Forum Project.

All committees have been active under the guidance of your President Elect, Joseph Littrell. The work of two committees is particularly vital to the operation of the Association each year. These committees are the Nominations Committee and Election Committee. I am pleased to announce the results of the AIAA election this year.

President Elect - Donald Hackett
Vice President for Classroom Teachers — Kenneth Gile

RECOMMENDATIONS FOR CONSIDERATIONS AND ACTION

Article III, Section IV, of the Constitution of the American Industrial Arts Association reads as follows:

> Section IV - A Representative National Assembly, consisting of delegates from state and national industrial arts associations which are affiliates of the American Industrial Arts Association, shall represent the membership at the annual business meeting held during the National Convention. All actions and decisions at the annual business meeting are the responsibility of the delegates to the Representative Assembly.

Each delegate has the responsibility to act in the best interests of the Association and its members. As President, I charge you with this significant responsibility and request your consideration of the following issues.

The major issue facing the Association is its governmental structure. Under the existing governance structure of the Association, your elected president cannot represent adequately the industrial arts profession composed of some 50,000 industrial arts teachers.

The basic problem is communication. The present governance structure does not provide a suitable or adequate information process. No referendum procedures are available to the members.

The only time the Association, through its delegates, sits in session to act on issues of national concern is at the annual conference. And as most delegates will admit, they are poorly prepared to represent their colleagues. As a result, the decision-making process by default has passed to your Executive Board, the Executive Secretary appointed by your Executive Board, and self-appointed representatives both within and outside the profession.

It is my judgment that the time has arrived where this Association must take decisive action to alter its governance structure. Therefore, I request of this Representative Assembly consideration of and action on the following issues.

A. Issue: Strengthening State and Local Associations

The Association, at present, has no workable organizational plan which provides for local-level involvement in a meaningful way of 50,000 industrial arts teachers. The Association is not structured in a manner to provide representation and services to classroom teachers on the local level.

What is needed is greater unification within the profession at the local, state, and national level. This can be done best through providing leadership and incentive for strengthening state associations. I therefore recommend the following resolutions for action by this representative assembly.

Be it resolved that the Representative National Assembly direct the Executive Board to:

1. Develop and adopt a position on unification of the profession that reflects the thinking of state association leaders;
2. Increase incentive in the profession for joining state-level industrial arts associations by adopting a unified membership and dues program with credit granted to state associations for each unified membership attained;
3. Develop and adopt a position which provides for direct involvement of each affiliated state association in nominating members for association committees;
4. Develop and adopt a plan of action for transition from an international conference each year to regional conferences each year with a major and truly international conference each two to three years; and
5. Strengthen local, state, and regional involvement in a unified profession at the national level by continuing the annual meeting of the present Representative National Assembly or some other Forum structured to carry out the business of the Association at the national level.

B. Issue: Strengthening National Leadership

Most associations confront the problem of the isolation of their leadership from the profession. The development takes place over time. The American Industrial Arts Association, with its present structure, has, I believe, reached the point where the problems and issues are too complex to continue with present structures and procedures.

If we desire to strengthen local and state associations and provide better services to classroom teachers, then local associations, state associations, and classroom teachers must have a greater voice in the operation of the Association. At present, the leadership for the Association has, for many reasons, accrued to teacher educators and supervisors. The structure of the Executive Board is weighted toward supervisors and teacher educators representing affiliated councils which have no financial responsibility to the Association. Yet, their representatives sit in judgment on the financial affairs of the Association.

The one-year term for president, established by the constitution, in effect makes each president a "lame duck" president. There is virtually no opportunity to serve the membership adequately. Many actions addressing critical issues require more time than the nine or ten months of an individual's presidency.

In addition, it is evident that the procedures for selecting your representatives leave much to be desired. There is little involvement on the local or state level.

It is also evident that it would be appropriate for each individual standing for election do so on a written platform which states his position with respect to industrial arts education. In the past, the record shows the Association has either knowingly or unknowingly elected officers to the Association and its affiliates who were more committed to vocational education than industrial arts.

I therefore recommended the following resolutions for action by this representative assembly.

Be it resolved that the Representative National Assembly direct the Executive Board to:

1. Evaluate the present structure of the Executive Board with respect to the needs of the Association, giving particular attention to the representation of classroom teachers, and local and state associations;
2. Prepare for review and action by the Association amendments to the Constitution providing:
   a. A two-year term for the Association President;
   b. Provision for local, state, and regional involvement in presidential nominations; and
   c. Provision that all elected officers be required to stand for election on a published platform.

C. Issue: Assessment of the Association's Missions and Goals

At present, the Association has no formal procedure for the assessment of the Association's missions and goals. Nor does the Association have formal procedures for planning for the future. The Association, like many others, operates on a reaction basis rather than a planned action basis. The membership is thus poorly served.

What is needed is a procedure whereby representatives of the Association are charged with the tasks of studying the issues, developing proposed position papers and plans of action for both short-term and long-range efforts by the Association. This process should be continuous, with at least one major report to the membership for action each year.

I, therefore, recommend the following resolutions for action by this representative assembly.

Be it resolved that the Representative National Assembly direct the Executive Board to:

1. Establish a Planning Council for the American Industrial Arts Association with sub-councils for each region and each state association for the purposes of: (1) studying the issues relevant to the Association, (2) ascertaining the missions and goals of the Association and (3) preparing position papers for action by the Association through the Representative National Assembly and the Executive Board.

D. Issue: Expansion of the Role of the Association in Meeting the Needs of Youth and Adults in Education in the Technologies

The American Industrial Arts Association, through its members, has provided leadership for the entire educational profession. Many innovations developed by industrial arts teachers have been and are being adopted by other fields of education. Our highly educated teachers, knowledgeable in the many areas required to function effectively in designing learning environments and programs of study, have important contributions to make to education in the future.

Studies have shown, however, that our mission has been restricted by what might be termed a T and I, craft or material, and processes mentality on the part of our leadership, including teacher educators and administrators.

It is past time to assess our role and mission. Our Association is being asked to expand its role and mission of educational leadership in education in the technologies. The results of the recent Forum Series only highlight the need.

Today, the needs and issues are in a high state of flux. It is difficult to define clearly all the areas of concern. One can only conclude that the needs, issues, and problems facing our profession today are the result of unprecedented technological and social change.

The membership of the American Industrial Arts Association thus finds itself concerned about a number of areas of education, all in some manner or other related to the central theme of industry, technology, and education. Included are areas such as: occupational education, career education, vocational and pre-vocational training, industrial education, elementary school technology, general education, interdisciplinary education, technical education, adult education, continuing education, international education, special education, environmental education, urban education, instructional technology, industrial science, information technology, industrial technology, industrial training, manufacturing, history of technology, transportation technology, research and development, industrial archeology, and many others, including futurology.

The present name of the Association and its organizational structure, composed primarily of councils devoted to special functioning groups such as teacher educators, supervisors, state association officers, and elementary school industrial arts, or committees such as research, curriculum and other similar activities, do not provide for the many diverse interests of the members or the developing needs and programs in the field.

I, therefore, recommend the following resolution for action by this representative assembly.

Be it resolved that the Representative National Assembly direct the Executive Board to:

1. Initiate action to change the name of the Association from the American Industrial Arts Association to the American Technology Education Association and

   Be it further resolved that the Representative National Assembly direct the Executive Board to:

2. Initiate action to provide within its organizational structure and those of its state affiliates, provision for sections or councils devoted to special areas of interest related to technology education including occupational education, career education, special education, environmental education, urban education, instructional technology, transportation technology, information and communication technology, and the history of technology, among others.

E. Issue: Governance of the Association

The foregoing issues and recommended resolutions are interim at best. It is my opinion that the Association has reached that point in time where prolonged and in-depth study must be given to the governance of the Association. The Association has come a long way since its inception and birth. The Association's potential for future contributions to education are excellent. Recognition of the importance of its mission continues to grow. However, the Association is operating under a constitution and by-laws suited to another time.

I, therefore, recommend the following resolution for action by this representative assembly.

Be it resolved that the Representative National Assembly direct the Executive Board to:

1. Appoint a Constitutional Review and Governance Committee composed of representatives of state associations, councils of the association, and representatives at large from each Region selected by the Executive Board, and

2. Initiate immediately plans for a Constitutional Convention to be held concurrently with, prior to, or immediately following the 1974 International Conference in Seattle, Washington.

F. Industrial Arts and Vocational Education

There is one issue which cannot be settled by a resolution. It is a perennial issue and will continue to be so for many reasons. This issue is industrial arts and vocational education. There are differences on the issue within the Association as well as outside the Association.

The American Industrial Arts Association and its members have always supported quality vocational education programs and have been willing to cooperate on the same basis as we cooperate with all segments of education. What the industrial arts profession must be concerned or preoccupied about, however, is not one area of education to the exclusion of all others, but the total education of all youth. Vocational preparation is one of many goals of education and one segment of the total education of all youth.

The American Industrial Arts Association is not antivocational. In fact, the American Industrial Arts Association and its membership have always supported basic education for all, including high-quality vocational and technical training.

The problem may be that certain vocational educators have lost sight of their mission, the preparation of individuals for gainful employment. It may be that the occupational structure has been altered so greatly that the structure of vocational preparation is no longer adequate, and those supporting certain programs find themselves in untenable and insecure positions.

Casual observation of this phenomenon indicates that the issue is not between industrial arts and vocational education represented by health occupations, business education, and home economics, for example. The problem is basically the trade and industrial education section of vocational education. The problem has become more acute of late.

It may be the issue is money. Could it be that we as an association and profession are permitting the potential of Federal money to dictate our mission and its objectives and goals? My observation is that for some this may be true. The behavior of some individuals indicates their philosophy may be shallow and their commitment self-serving. The usual comment is: "That's where the money is" or "We better get on the bandwagon or we will be left behind."

We seem to be living in an age of expediency. We react to the situation rather than act on established goals and principles. We are descended upon by self-appointed individuals, self-selected groups, or trade publications that propose themselves as spokesmen for industrial arts nationally. These individuals and groups act without the sanction of this representative assembly or other recognized constitutional bodies of the American Industrial Arts Association at both the state and national levels. In some instances, the United States Office of Education has been instrumental in sanctioning and promoting activities concerning industrial arts education by by-passing your elected and appointed leadership through the appointment of their own surrogates charged with determining the future purpose and function of industrial arts in public education.

In a very positive way, we can perhaps recognize these actions as our loyal opposition; a loyal opposition that claims the Association and its members don't know where they stand. This opposition damns both our actions and our inactions. We are damned if we do act and damned if we don't act. But the problem isn't that we don't know where we stand. The problem is our gentle critics don't like where we stand nor the turf we occupy. Our position on the education of youth in a democratic society threatens their security. Our silence angers them. Our good work and programs disturb them. They are frustrated and take their frustrations out in efforts to seek more protective legislation at more cost with fewer options rather than solutions to the real issues and social problems facing education and society today at less cost and more options. There are no simplistic solutions to these problems, and our field has never proposed simple solutions.

This should be clearly evident to all who read our credo, "This We Believe."

THIS WE BELIEVE

Industrial Arts . . .

. . . should be a part of the learning experiences of all students at all levels of grade and ability, in order that they may understand and learn to control their industrial-technological environment.

. . . is an organization of subject matter which provides opportunities for experiences concerned with developing insights into the broad aspects of industry; such as construction, transportation, communication, manufacturing, and research and development with the resulting personal and technological effects.

. . . content deals with the principles and concepts of industry. It concerns itself with industrial production and servicing, including a study of such principles as application of mechanisms, influence of automation and mass production, creation of new ideas and products, implications for consumer literacy, wise applications of leisure time, and respect for quality workmanship.

. . . uniquely contributes to students who must leave school early and those who continue their formal education; for students with low scholastic ability and those on the honor roll; for the future industrial workers and for the future professionals; for those of both high and low economic status. All members of society must learn to be aware of and to live effectively in today's technological culture.

. . . activities form a continuum with other visual and applied arts, ranging from the free-expressive forms to the more exacting demands of machine tools and the ordered sciences.

. . . employs actual involvement of tools, machines, and materials, which reinforces the written and spoken word. It enables all students to derive meaning from concrete experiences which aid in the understanding of abstract ideas.

. . . provides technical skills and knowledge basic to most occupations and professions. Industrial arts enables the future scientist and engineer to solve technical problems, and the future craftsman or technician to develop skills and obtain technical information.

. . . fosters an awareness of the world of industry and its place in American culture. It also provides opportunities for learners to discover and develop their talents and abilities in the areas of technology and applied science in the world of industry.

. . . provides wholesome changes in learners. These may take the form of a developed interest in the man-made world — its materials, products, and processes. These changes also involve self-evaluation of attitudes toward constructive work and how this work can be utilized for health and recreation, as well as economic value; they may involve the development of a favorable attitude toward creative thinking, and toward character improvement — knowing and making the most of one's environment.

. . . requires the highest level of competence from its instructional staff. Teachers must possess creativeness and ingenuity, must enjoy working with people, and must maintain a high degree of personal and professional integrity.

G. Other Programatic Considerations and Issues

There are a number of other actions this representative assembly and the Association should address. Among the issues are:

1. In-service Education
2. Teacher Education
3. State and Local Supervision
4. Curriculum Standards
5. Education of School Administrators and the Public about Industrial Arts Education
6. New Legislation
7. The 1976 Centennial

There has been much change in education in the past decade. The field of industrial arts has faced a massive challenge in the content and structure of its programs because of changing technology. The only constant today seems to be change.

It, therefore, seems appropriate that the American Industrial Arts Association initiate and promote plans, procedures and programs of in-service education on a continuing basis throughout the nation as a means of aiding each teacher in contributing to high quality education in industrial arts and technology. A national effort by the Association involving state and local associations would aid in providing the greater unity we seek.

Closely associated with the problem of change for the in-service teacher is the problem of teacher education. The Association and its members must address this issue. Many programs of teacher education lack basic support in physical facilities and staffing. Many are staffed by poorly prepared personnel. Many are antiquated and out of date. The Association has the obligation to determine minimal standards for all programs of industrial arts teacher education. The Association also has the obligation to seek procedures for accrediting or sanctioning programs. There is nothing more tragic than a recent graduate lamenting the inadequacies of his undergraduate education and teacher preparation. The Association must assume the responsibility of assisting in the improvement of teacher education so graduates of all teacher education programs begin their careers with a knowledge level capable of mastering present and future technology.

The importance of state and local supervision of industrial arts programs cannot be denied. The Association should initiate action to promote state supervision of industrial arts in all states and establish minimal qualifications for state and local supervisors, as well as the nature of their responsibilities with respect to quality educational programs.

The question of curriculum is difficult to engage. The decade of the 1960's ushered in many proposals calling for new content, structure, and methods. Many state curricular guides published since 1970 reflect the curriculum research and development of the 1960's.

However, there is much confusion on the part of school administrators and the general public about the new industrial arts and technology programs. I propose as a minimum two actions by the Association with respect to the curriculum question.

1. Initiate action to publish a curriculum guide for school administrators and the public which provides information on a number of curricular options and alternatives most accepted by the profession, together with proposed offerings, time schedules, and facilities required.
2. Initiate action to conduct, on a national basis, through states and regions, an Educational Forum Series for school administrators, parents, students, and others on the general topic of Man/Society/Technology education and the role of industrial arts education in the education of all youth.

The question of funding is always central to quality education. Recently industrial arts was included for funding purposes in legislation on vocational education. The U.S.O.E. has stipulated that industrial arts must be considered and included in state plans for vocational education. Under certain conditions, industrial arts programs can receive funds by this procedure. However, in my opinion, the legislation and procedures are highly restrictive and will limit industrial arts from reaching its full potential in meeting the needs of all students.

Quality programs of industrial arts do have special needs which require a higher level of funding than other general education programs. Therefore, I propose the Association initiate action to design model legislation for consideration by the Congress of the United States to create a Technology Education Act for the purpose of incorporating the broad span of education in the technologies in the public schools for all students unrestricted by specific vocational goals.

I further propose that model legislation be designed for consideration by state legislatures for the support of technology education programs as a means of increasing the technological literacy of the citizens of each state and improving the potential of the state and its citizens in the future. This legislation should also be entitled: Technology Education.

In 1976, our country will be celebrating its 200th birthday as a republic. It is significant that the success of our country in providing one of the highest standards of living for the most people ever is a democracy whose fundamental economy has been based on industry and technology. It is also significant that industrial arts education has had the mission as a part of education in this country to teach our youth about the industrial and technological elements of our culture.

I, therefore, propose that the American Industrial Arts Association initiate action immediately to conduct during 1975-1976 a new Man/Society/Technology Forum Series with the goal of developing at local, state, and national levels projections and plans for the American Industrial Arts Association for the next century. I further propose that the 1975-1976 Man/Society/Technology Forum conclude its work at a 1976 International Conference with reports of work and studies projecting our Association and its work to the next century, the year 2000, and beyond.

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